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Measuring Additionality in  
Apprenticeships

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RESEARCH

The views expressed in this report are those of the authors and not necessarily those of the Department for Business, Innovation and Skills.

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# Executive Summary

## Why we are concerned about deadweight and additionality

The State has increasingly played a key role over the past thirty to forty years in ensuring that the provision of Apprenticeship and work-based training has been sufficiently voluminous and met certain quality thresholds. This reflects policy makers' concerns during this period that the market alone would not deliver the initial vocational education and training (IVET) the country needed.

With the State funding a substantial share of the cost of providing Apprenticeships it is inevitable that questions should be asked about deadweight and additionality. If the various actors (e.g. employers, employees, government and learning providers) are benefiting in some way from public investments in the further education system, an important question to address is whether they should bear more of the cost of the training they benefit from, and to what extent. The concepts of deadweight and additionality lie at the heart of addressing such issues: that is, how much Apprenticeship and other work-based training would take place in the absence of public funding?

## A conceptual framework for the analysis of additionality has previously been developed and tested

In the BIS-commissioned paper 'Assessing the Deadweight Loss Associated with Public Investment in Further Education and Skills', London Economics (2012) developed a conceptual framework aimed at improving the analysis of additionality in publicly-funded Further Education and Skills provision. The framework categorises different elements of additionality and deadweight, and identifies the data required to facilitate the empirical estimation of these elements. Within this framework, London Economics (LE) applied propensity score matching to the National Employer Skills Survey (NESS) 2009 in order to estimate the quantitative deadweight and additionality for Train to Gain (TtG) and Apprenticeships. LE recognised various shortcomings of their analysis and recommended that a comparison group study be undertaken to more robustly assess additionality in Apprenticeships and other publicly-funded work-based learning.

## This study makes recommendations to further improve the analysis of additionality

This study was commissioned in September 2012 by the Department for Business, Innovation and Skills (BIS). The research team was led by Cambridge Econometrics (CE), in collaboration with the University of Warwick Institute for Employment Research (IER). This study has taken as a starting point the framework and recommendations made by LE, and then built on that work by:

- reviewing datasets, and in particular the Evaluation of Apprenticeships Survey of Employers (EASE) which has become available since the LE study, to assess how they can improve our estimates of deadweight and additionality;

- using data from EASE and the National Employers Skills Survey (NESS2009) to try to shed light on deadweight and additionality by sector; and
- identifying the additional data required to be able to make more robust estimates of deadweight and additionality, and recommending an approach to collect that data.

This study is effectively a scoping study, to determine the best way forward to improve estimates of additionality using comparison group analyses; it informs BIS' decision as to how best to further develop the evidence base in this area.

## Learning from previous comparator group analyses

This study has reviewed previous studies that have used comparator group analyses<sup>1</sup> to evaluate interventions in training and other policy areas. The review: collates and compares existing estimates of the additionality of training programmes; and provides insights into appropriate methods for comparator group studies.

### Those sectors where the employer encounters a relatively high net cost in delivering the Apprenticeship tend to display relatively low levels of quantitative additionality

A wide range of studies are now beginning to reveal a degree of consensus in their findings. In general, those sectors where the employer encounters a relatively high net cost in delivering the Apprenticeship are also ones where the Apprenticeship is seen as a necessary investment (and where the average returns tend to be higher, such as construction and engineering) in order to guarantee that future skill needs are met. Accordingly, these are employers / sectors which display relatively low levels of quantitative additionality<sup>2</sup>. This is because the employer would need to continue to invest in Apprenticeships – more or less at current levels - even if the public programme was to be abolished or its funding levels reduced. If this were to happen there may be a substantial loss of qualitative additionality (such as training to an externally accredited standard or provision of transferable skills which would have knock-on effects for the economy as a whole).

### It is difficult to be fully assured that like is being compared with like

The analyses reviewed, and that undertaken in this study, have a number of caveats attached to them. The principal one being that it is exceedingly difficult to ensure that the treatment group (employers which currently have apprentices) is being compared with a sufficiently well identified comparator group. In other words, it is difficult to be fully assured that like is being compared with like.

We recommend that the only practical way forward for any evaluation strategy is through: using more than one type of comparator group to reflect the range of alternatives to

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<sup>1</sup> Other approaches, such as Randomised Control Trials and area comparisons were also discussed.

<sup>2</sup> However, the results of our initial analysis by principal framework are not all consistent with this.

Apprenticeships; and matching employers in these treatment and comparator groups according to various criteria. The matching of employers requires data to be obtained from or about employers which have apprentices and their situation to be compared with those employers which otherwise have the same set of characteristics as the apprentice employing ones, but which do not currently have apprentices. This is the approach adopted in the analysis by both LE and in our own analysis in this report.

## **Assessing the feasibility of using existing data to undertake further analysis of additionality**

Of particular interest in our review of the key datasets were: the Evaluation of Apprenticeships Survey of Employers (EASE) data which has become available since the LE study; and the NESS2009 (follow-up survey) that includes information on expenditure on training. The review of the data indicated that there was scope to try undertaking further analysis of additionality using these data. This report presents the findings of that further analysis.

## **Estimating deadweight loss and additionality by Apprenticeship framework**

One of the benefits of the EASE survey is that it categorises employers by the principal Apprenticeship framework in which they are engaged. We have undertaken analysis to illustrate how EASE and the National Employers Skills Survey (NESS2009) could be used to estimate additionality by Apprenticeship framework. Our results provide a message consistent with that from the LE analysis about the relative size of deadweight loss and additionality across all frameworks in total. By framework, statistically significant estimates of quantitative additionality are found for only a few of the, larger, frameworks (including Engineering, Construction and Retail); the lack of significance in the results for many of the frameworks is likely due to the relatively small sample sizes. Perhaps the most surprising finding is the relatively high level of quantitative additionality estimated in engineering; other studies have indicated that employers in the engineering sector are recurrent investors in Apprenticeships.

## **Using training expenditure data as an alternative measure of training**

The follow-up survey from NESS2009 gathered information on expenditure on training. We undertook analysis to investigate how these data could be used as an alternative measure of training (i.e. training expenditure, which could capture scale and quality of training<sup>3</sup>). The results suggest that public expenditure on Apprenticeships did leverage in further private expenditure on training. However, the analysis was limited by the characteristics of the data: the manner in which the comparator group could be defined was restricted; and the results may be distorted by the inclusion of 'trainee labour costs' in the measure of training expenditure.

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<sup>3</sup> Using training expenditure data, rather than number of apprentices, allows us to make an estimate of deadweight that is conceptually closer to what we are trying to measure – the additionality/deadweight associated with each £1 of government funding.

## Assessing how data can better be collected and used to improve estimates of additionality using comparison group analyses

Our further analysis illustrates how existing data could be used to improve estimates of deadweight and additionality. However, this further analysis can be taken only so far before it becomes limited by the characteristics of the existing data. The limitations of the existing data include the insufficient availability of suitable indicators to:

- match employers in the treatment and comparator groups
- characterise why employers engage in one form of training over another, or why employers do not participate in Apprenticeships
- measure outcomes of employers participating in Apprenticeships - in particular, whether skill needs are better matched by participation in Apprenticeships
- better measure qualitative additionality - the extent to which Apprenticeships are associated with training of a higher standard (however defined), the delivery of transferable skills, and bringing new ideas into the workplace

In summary, to facilitate improved comparator group analyses, the data which are required for both the treatment and the comparator group are outlined in Table 1 below. The critical issue is how data collection can be improved to overcome some of the existing data limitations so as to allow much better comparisons to be made.

**Table 1: Outline of data required from treatment and comparator groups in a survey**

Treatment Group	Comparator Group
Detailed information on employers' characteristics on which to match employers in both groups	
Detailed information about recruitment practices	
Detailed information about current training practices	
Rationale for investing in Apprenticeships	Rationale for not investing in Apprenticeships and preferences, if applicable, for some other type of initial vocational education and training
Types of Apprenticeship in which invested (for example, framework)	
Benefits derived from Apprenticeships	Are similar types of benefit derived from other types of training
Impact on meeting skill needs (for example, hard to fill vacancies)	

There are two options which might be considered in conducting an evaluation of Apprenticeships:

- (i) a bespoke survey which contains a treatment group (employers participating in Apprenticeships) and a comparator group (employers not currently participating in Apprenticeships);
- (ii) continuing with the current EASE as the treatment group and using an existing survey, such as EPS or (N)ESS as the comparator group. In order to meet the needs of the evaluation both EASE and EPS/(N)ESS would need to contain additional questions.

Conducting a **new bespoke survey** which contains treatment and comparator groups would have the advantage of being able to address all of the issues which are germane to the evaluation of Apprenticeships and would bypass the need to gain the agreement of the organisations which are responsible for EPS / (N)ESS. The disadvantage of this approach is that it would be expensive. It would also result in an additional employer survey being conducted – that is, the comparator group element of EASE – at a time when survey fatigue amongst respondents would appear to be driving down response rates. Moreover, many of the questions which are likely to be asked of the comparator group are already asked in other surveys. In addition, there are likely to be relatively few questions asked of the comparator group.

In contrast, **continuing with the current EASE** and using an existing survey as a comparator group would have the advantage of being more cost effective. The disadvantage is that it would require the agreement of the organisations responsible for the existing surveys to additional questions being added or replacing existing questions. Increasing the length of these surveys could have a detrimental effect on response rates and if existing questions are to be removed to make way for these new ones, then their relative priority will need to be considered. There is no guarantee that agreement could be obtained which would allow all of the evaluation questions to be included, which would then potentially jeopardise the evaluation. Moreover, since there will be a need to modify some existing questions in either EPS or (N)ESS this may prove difficult to negotiate

### **We recommend that a two-survey approach to data collection be continued**

On balance, we recommend an approach which uses a modified version of EASE to form the **treatment group** and either EPS or (N)ESS – with some modifications – to form the **comparison group**. This would appear to be a more cost-effective solution than a bespoke survey, although the precise cost implications of adding questions need to be thought through, especially given the large number of employers surveyed in EPS and (N)ESS.

### **We recommend that greater consideration be given to qualitative additionality**

We consider that the analysis of additionality using existing data sets has gone about as far as it can. More sophisticated econometric and statistical techniques might be applied to existing data which might improve the precision of any estimates, but they will face the same problems that are set out in detail in this report. For now the picture which emerges is that employers which are likely to invest most in Apprenticeships record lower levels of

quantitative additionality because they need to invest in Apprenticeship style training to meet their current skill needs. But other evidence suggests that they gain a relatively large amount of qualitative additionality which, in aggregate, is of considerable value to the economy.

Any further investigations therefore need to give qualitative additionality as much weight as the quantitative form. To do otherwise will potentially lead to a distorted view of the extent to which public funding of Apprenticeships benefits employers and their apprentices. This is particularly important at a time when public policy is driving Apprenticeship standards higher through both the Specification of Apprenticeship Standards in England, and its response to recent reviews of Apprenticeships (for example, the Holt and Richard reviews respectively).

# 1. Introduction

This is the final report for the study commissioned in September 2012 by the Department for Business, Innovation and Skills (BIS) and entitled 'Measuring Additionality in Apprenticeships'. The research team is led by Cambridge Econometrics (CE), in collaboration with the University of Warwick Institute for Employment Research (IER).

## 1.1 Background

'Rigour and Responsiveness in Skills' highlighted Apprenticeships as one of the key priorities, alongside raising standards, maintaining clear pathways into work and ensuring qualifications are relevant and responsive. Driven by the need to maximise the value of Apprenticeships, is the need to better understand the economic costs and benefits to investing in work-based training and how these accrue to different actors within the learning system e.g. employers, employees, government and learning providers.

If the various actors are benefiting in some way from public investments in the further education system, an important question to address is whether they should bear more of the cost of the training they benefit from, and to what extent. The concepts of deadweight and additionality lie at the heart of addressing such issues: that is, how much further education and skills training would take place in the absence of public funding?

In practice, this proves to be a difficult question to answer if only because the further education and skills system encompasses a disparate set of activities and, sometimes, it is not simply a question of whether or not training would have been undertaken at all, but which elements might have been provided. In the case of Apprenticeships, for instance, employers might continue to deliver the NVQ element of the training but not the other elements which comprise completion of a framework, or they may not seek to get the NVQ element accredited. Already, employers are expected to contribute to the costs of funding vocational education and training (VET) – for example where it is not a first Level 2 or 3 qualification or if the trainee is aged over 19 years (where a percentage of the fees may be payable) or over 25 years (in which case all the fees may be payable). Evidence suggests that employers' training decisions with respect to Apprenticeships are sensitive to the level of public funding available (Winterbotham et al., 2012). With respect to individuals there has been relatively little research interest in the extent to which their training decisions have been influenced by the availability of state-funded training, though the presumption must be that it is likely to be highly influenced.

In the BIS-commissioned paper 'Assessing the Deadweight Loss Associated with Public Investment in Further Education and Skills', London Economics (2012) developed a conceptual framework aimed at improving the analysis of additionality in publicly-funded Further Education and Skills provision. The framework categorises different elements of additionality and deadweight, and identifies the data required to facilitate the empirical estimation of these elements. Within this framework, LE applied propensity score matching to the National Employer Skills Survey (NESS) 2009 in order to estimate the quantitative deadweight and additionality for Train to Gain (TtG) and Apprenticeships. LE recognises the various shortcomings of their analysis, including: the difficulty in identifying the treatment and comparator groups of firms; and, the bluntness of the measure of

training activity. LE recommended that a comparison group study be undertaken (potentially using a matched employer-employee level dataset) to more robustly assess additionality in Apprenticeships and other publicly-funded work-based learning.

## 1.2 Objectives

The key question that BIS wishes to answer through analysis of additionality is: “If public funding of Apprenticeships was removed, how much training (and of what quality) would firms undertake?” The aim of this particular project is to determine a suitable and cost-effective methodology to answer that question.

This study has taken as a starting point the framework and recommendations made by LE, and then built on that work by:

- reviewing datasets, and in particular the Evaluation of Apprenticeships Survey of Employers (EASE) which has become available since the LE study, to assess how they can improve our estimates of deadweight and additionality;
- using data from EASE and the National Employers Skills Survey (NESS2009) to try to shed light on deadweight and additionality by sector; and
- identifying the additional data required to be able to make more robust estimates of deadweight and additionality, and recommending an approach to collect that data.

This will inform BIS’ decision as to how best to further develop the evidence base in this area. This project is therefore effectively a scoping study, to determine the best way forward to improve the analysis of additionality.

## 1.3 Overview of the report

This Chapter gives an overview of the study. Chapter 2 presents the findings of a review of approaches to estimate additionality, while Chapter 3 reports the findings of the review of data. Chapter 4 presents the results of further statistical analysis carried out using existing data, and Chapter 5 presents the conclusions and recommendations of the study.

## 2. Review of Approaches to Estimate Additionality

### 2.1 Introduction

This chapter presents the findings of the review of the work undertaken by London Economics and relevant comparison group analyses in other policy areas. This review has been undertaken: to collate and compare any existing estimates of the additionality of training programmes; and to gain insights into appropriate methods for comparator group studies. Section 2.2 outlines the evolution of state-funded vocational training which underpins the interest in understanding additionality and then Section 2.3 introduces a framework for considering additionality. Sections 2.4 and 2.5, respectively, summarise the insights into measuring additionality from the review of UK and overseas literature. Section 2.6 presents a typology of approaches to measuring additionality and illustrates the strengths and weaknesses of each approach and Section 2.7 highlights the issue of defining the comparator group. This chapter ends with our proposed framework for improved analysis of additionality (in Section 2.8) and concluding remarks (in Section 2.9).

### 2.2 Why Measure Additionality

#### 2.2.1 Since the 1980s the State has met a large part of the cost of vocational training

The Industrial Training Act (ITA) – implemented (in 1964) because of concerns by the Treasury that industry was providing too little training – introduced Industrial Training Boards (ITBs) and the grant levy system which was used to fund, amongst other things, Apprenticeships up until the 1980s. The impact of the ITA on the funding of Apprenticeships suggests that they were left largely self-financed by industry. Despite establishing the ITBs, Government was largely non-interventionist with regard to influencing training activity by industry.

The long-running criticism of the ITBs was that much of the training they promoted was industry-specific which did little to foster flexibility in the labour market (Wikely, 1990). Moreover, the Apprenticeships under their aegis were expensive – given that they were of relatively long duration and apprentices were paid a percentage of adult wage rates which were rising quickly over the 1970s due to inflation – and recruited a small proportion of all school-leavers (Haxby, 1989).<sup>4</sup> In order to increase participation levels, Government via the Manpower Services Commission - created in 1973 - provided grants in order to boost the number of apprentices. Arguably this was the State's initial foray into directly influencing the provision of vocational training by employers. Whilst the State was looking to boost the number of apprentice places over the 1970s, the MSC, concerned at the low take-up of Apprenticeships, was developing alternatives to it. This resulted in a number of new vocational training initiatives being introduced over the early 1980s.

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<sup>4</sup> Around 15% of all school leavers and mainly young men

Most ITBs were abolished in 1981 and replaced by non-statutory training organisations (NSTOs) which, by the 2000s, had metamorphosed into Sector Skills Councils. With the abolition of the ITBs and the creation of the NSTOs there appears to have been increasing recognition within Government that more needed to be done to stimulate the supply of, and demand for, skills. It was also apparent that with structural changes taking place in the economy, the introduction of the Youth Training Scheme (YTS), and the increased provision of vocational qualifications through further education colleges, that the number of Apprenticeships starts had declined precipitously.

YTS was initially introduced in order to tackle high levels of youth unemployment. Employers were to provide young people with foundation training with the wage of the trainee met by Government. There were concerns that the YTS failed to provide sufficient training to its participants which, eventually, led Government to introduce Modern Apprenticeships (MA) in 1994 (Hogarth et al., 2011). MAs were designed to provide the high quality, structured training associated with traditional apprenticeships but they would apply across industrial sectors, and their completion would be wholly competence based<sup>5</sup> rather than being time-served. This would allow people to complete more quickly. As noted above, during the 1960s and 1970s there were concerns that Apprenticeships took too long to complete.

It is also apparent that the publicly funded programme of Apprenticeship has gradually subsumed much of the workplace based training leading to a vocational qualification at Levels 2 and 3. At the time MAs were introduced in the early 1990s, many employers had their own initial vocational training programmes. At the time, some employers appeared reluctant for one reason or another to engage in training leading to the award of an NVQ, but since then employers have increasingly used Apprenticeship as a means of providing initial vocational preparation to those recruited straight from school or college to training programmes below graduate-level ones (HoL, 2007).

With YTS and MAs, the State took over more responsibility for meeting the cost of providing post-compulsory vocational education. Under the successor to MAs, Apprenticeships, it is estimated that the State has met around half the total cost of an Apprenticeship through, primarily, funding training delivered by training providers (Hogarth et al., 2012). As a result there has been increasing interest in the added value resulting from the provision of public funding. How that can be assessed is addressed below.

## 2.3 Measuring Additionality in Apprenticeships

### 2.3.1 There are a number of considerations in addition to quantitative additionality

London Economics (2012) in their analysis of additionality succinctly summarise the various measures of interest with respect to a continuum. At one end of the continuum is pure additionality (the training received by individuals that would not otherwise have received any training). At the other end is displacement (the same workers that would

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<sup>5</sup> Where the individual apprentice's competence is assessed to determine whether an NVQ would be awarded.

have gained some comparable form of training) and substitution (where there is a change in the profile of the employees who receive training) (p.11).

The London Economics approach is essentially concerned with quantitative estimates, but there is a desire to broaden the concept to include qualitative aspects too. Accordingly, additionality might be conceptualised with reference to the following:

- Quantitative additionality
  - how many apprentices or trainees would have received any training in the absence of public funding
- Qualitative additionality
  - would the employer have adopted a different programme of training and would this be at the same level as the equivalent Apprenticeship;
  - would the content of training be delivered at the same level or at a different level (for example, more focus on skills needed by employer rather than the industrial sector or economy more generally);
  - would a (transferable) qualification be provided
- Wider considerations
  - There is also, from a qualitative aspect, a need to consider how, in the absence of Apprenticeships, employers might reconfigure the organisation of work. A number of possibilities are available here, including:
    - subcontracting work which might have been undertaken by apprentices, to other employers or sites;
    - shift to graduate recruitment with concomitant changes in the organisation of work;
    - resort to recruiting fully experienced workers rather than apprentices or trainees;
    - training-up existing employees working in less skilled jobs. <sup>6</sup>

In looking at the issues of quantitative and qualitative additionality the essential question which is being asked is whether Apprenticeship as a whole, or some particular aspect of Apprenticeship, is better than something else. The choice of an appropriate comparator is returned to later in this report. It is clear that individuals and employers have options available to them. From the perspective of the employer there are a number of options

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<sup>6</sup> Of course, Apprenticeship could be used to train-up existing employees

which are either implicitly or explicitly encompassed in the typology of additionality outlined above:

- withdraw from engagement with initial vocational education and training (IVET);
- upskill less skilled workers in the organisation - that is, effectively lowering the quality of recruitment from a skills perspective and using training in order to compensate for this, though not necessarily training to the same level;
- recruiting more graduates and reconfiguring work roles in the organisation to allow graduates to substitute for apprentices.

Receipt of public funding to deliver Apprenticeships may result in other groups in the workplace – who are not eligible to receive public funding to support their training – being provided with employer-funded training.

Consideration also needs to be given to the relative impact of Apprenticeships on organisational performance. There is some evidence that the provision of Apprenticeship training has an impact on this (Winterbotham et al., 2012; Vogler-Ludwig et al., 2012). Though, again, the key question is whether Apprenticeship is better than something else in bringing about improved organisational performance.

## 2.4 Domestic Evidence on Additionality

### 2.4.1 The estimated level of additionality has increased over time based on employer survey evidence

Since the introduction of MAs there have been a number of studies which have, from the employer's perspective, sought to determine the extent of additionality. The questions asked of employers in the surveys designed to capture measures of additionality differ in the various studies. Hasluck et al. (1996) ask questions about what the employer would have done in the absence of Modern Apprenticeships, whereas Riley and Metcalfe (2003) asked questions about what training the employer had engaged in previously. The most up to date survey by Winterbotham et al. (2012) asks about the impact of funding on: (a) the decision to recruit apprentices; and (b) the number of apprentices recruited. Because of the different approaches to measuring additionality in the various studies an element of caution is required in making comparisons between them.

The survey undertaken at the time Modern Apprenticeships were introduced indicated that around 80% of employers reported that they would have continued to recruit trainees if there had not been a Modern Apprenticeship initiative (Hasluck et al., 1996).<sup>7</sup> This related only to employers providing training at Level 3. A later study, in 2003, at a time when Modern Apprenticeships were more established, indicated that 54% of employers providing training leading to a Level 3 Apprenticeship would have provided that training in

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<sup>7</sup> 12% of employers said they would not have taken on apprentices, and of those who would have taken on apprentices, a further 4% of employers overall said they would have taken on fewer employers, so the estimate of additionality is 16%

the absence of Modern Apprenticeships (Riley and Metcalf, 2003). The equivalent figure for Level 2 Apprenticeships was 44%. The survey evidence points to qualitative additionality too, including the use of externally accredited qualifications (i.e. NVQs) and the use of more structured training.

The evidence cited above is now rather dated. The Evaluation of Apprenticeships Survey of Employers 2011 (EASE2011) (Winterbotham et al., 2012) provides a much more up to date indication of additionality. Since the survey was interested in how changes in funding would affect employers' provision of Apprenticeships, questions were asked about what would happen if employers who recruited apprentices aged over 19 years had to pay half or all of the amount of funding currently provided by the State. When asked whether they would still have trained apprentices over the last three years if they had had to bear the full costs, 15% of employers - who offered Apprenticeships to people aged 19 years and older - indicated that they would have still trained through an Apprenticeship. Nearly three quarters of employers (72%) indicated that they would not have trained through Apprenticeships. When asked about the impact of paying half the total cost, 29% of employers reported that they would have trained people through Apprenticeships, and 58% indicated that they would not have done so.<sup>8</sup>

Of all employers with apprentices aged 19 years and older, 11% would not have changed the number of people trained through the programme if required to pay full fees whilst 6% would have taken on fewer apprentices. In the case of half fees, 20% would have maintained their apprentice numbers whilst 8% would have trained fewer. The study estimated that the number of apprentices aged 19 years and older would be 85% lower if employers faced full fees and 73% lower with half fees. Considering the total number of apprentices, including 16 to 18 year olds (the numbers of which are assumed to be unchanged in the presence of fees) as well as those aged 19 years and older, a decrease of 61% was found for full fees and 53% for half fees.

#### **2.4.2 The relatively high levels of additionality reported are a consequence of the expectation that Apprenticeship training is subsidised by the State**

To some extent the relatively high levels of additionality reported in the 2011 survey, certainly when compared with those reported in the earlier surveys, are a consequence of the expectation that Apprenticeships, as a training programme, is one subsidised by the State. Responses to the questions, therefore, are likely to have been conditioned by the funding regime which had been in place since 1994. As noted above, however, a great deal of caution is required in making comparisons between the various studies.

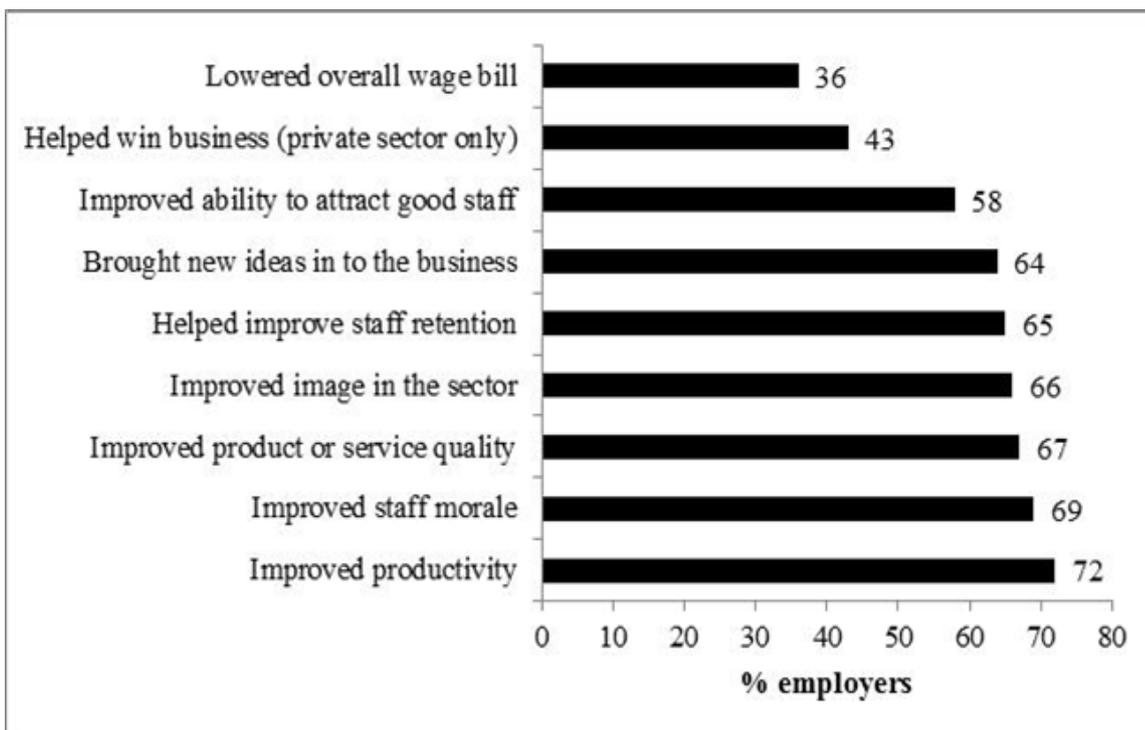
If employers were to cease their participation in Apprenticeships, 80% of employers said that instead they would look to retain more of their skilled employees, and 68% said they would continue to recruit trainees but would use an alternative form of training. More than 50% said they would expect to recruit fully experienced workers instead of apprentices or would recruit older, more experienced workers who required less training. Recruiting more graduates into jobs usually filled by apprentices was a relatively uncommon response reported by 29% of employers.

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<sup>8</sup> See Table 6.5 in Winterbotham et al. (2012)

EASE2011 does not contain a comparator group of employers who trained through other means, but it does provide the opportunity to gauge the extent to which Apprenticeship is better than a range of alternatives where employers had used those alternatives in the past. The survey reveals around two fifths of employers preferred Apprenticeship to the available alternatives, with 5% preferring the alternatives. Employers particularly valued the capacity of Apprenticeships to improve learners' skills and productivity during the training. Employers overall could point to a number of benefits they derived from participating in Apprenticeships (see Figure 2.1), principally that of improving productivity.

**Figure 1: Main business benefits from participating in Apprenticeships**



The data from EASE2011 reported a number of positive business benefits which result from delivering Apprenticeships and which, presumably, would not arise without the training. EASE2011 is important because it provides a baseline against which to gauge employer support for Apprenticeships with a backdrop of changes in vocational training policy, especially the changes which relate to funding, over time.

### 2.4.3 Identifying a comparator group against which to compare Apprenticeship employers is far from straightforward

Ideally one wants to have something against which to compare the experiences and responses of employers with apprentices. Gambin et al. (2010) point out that identifying a comparator group against which to compare Apprenticeship employers is far from straightforward given that there is potentially something unique about this group.

To date, the only study which has attempted to compare treatment and comparator groups is that undertaken by London Economics (2012). In this study the treatment group

comprises employers with at least one apprentice, and the comparator group is employers not participating in publicly funded training programmes.

The evidence suggests that deadweight loss associated with Apprenticeships is 28% (i.e. in the absence of the programme, 28% of apprentices would have undertaken some training). This estimate is higher than that recorded in any of the Apprenticeship employer surveys outlined above. The authors of the report point out that because of data limitations the estimates are indicative and should be treated with some caution.

#### 2.4.4 There is considerable uncertainty attached to how much Apprenticeship training would take place without public funding

In general, whilst rigorous approaches have been taken to estimating the level of additionality in Apprenticeships there is uncertainty attached to the actual level of Apprenticeship training which would take place in the absence of the publicly funded programme. Table 2.1 below indicates the level of additionality estimated in various studies of Apprenticeships.

**Table 2.1: Estimates of Additionality in Apprenticeship Surveys (%)**

Study / Dates	Notes	Level 2	Level 3	All
Change in volume of employers training				
Hasluck et al. (1996)	Survey of employers: Level 3 only		16	
Anderson and Metcalfe (2003)	Survey of employers	47	56	
EASE (2011)	Survey of employers – estimates for those with apprentices over 19 years			72
Change in volume of apprentices trained				
EASE (2011)	Survey of employers (apprentices over 19 years, presuming full fees to be paid)			85
London Economics (2012)	Econometric analysis of comparators			72
Note: Some of the earlier surveys report on the per cent who would have trained anyway - the reciprocal of these estimates has been provided here.				

It is readily apparent from a review of the evidence above that little is known about qualitative additionality. Much of the effort has been expended on estimating the increase in the number of employers participating in Apprenticeships and the number of additional apprentices. The various surveys of employers with apprentices collect information about the benefits they derived as a consequence of taking on apprentices. And where employers reported having used alternatives to Apprenticeships some comparisons about relative quality of Apprenticeships versus the alternatives have been produced.

It needs to be borne in mind that employers tend to invest in training those employees who are relatively highly skilled. Apprenticeships, especially at Level 3, may well provide the platform on which employers will base their further investments in continuing vocational education and skills. Thus Apprenticeships are likely to leverage further employer investments in employees' skills.

## 2.5 Evaluation Evidence from Abroad

There is relatively little evaluation evidence relating to employers from abroad. Much of the evidence relates to evaluating the destinations of apprentices and trainees from various training and education programmes. Typically this uses administrative data.

Where employers are engaged in training, much of the effort has focussed on identifying the employers' costs and the extent to which those costs can be recovered over the course of the training period benefits. Wolter et al. (2003) and Mühlemann et al. (2007, 2009) have produced estimates for Switzerland, Beicht et al. (2004) for Germany, and Karmel and Rice (2001) for Australia. Arguably, one reason for this is that the Apprenticeship system in countries such as the Netherlands, Germany, and Switzerland is so embedded within the social contract that there is less interest in testing what would happen with no or less public funding.

The Australian system is similar to that found in the UK insofar as the off-the-job training element which takes place in vocational training schools is funded via the State. Yet there is relatively little evidence which indicates the extent to which training would take place without public funding.

## 2.6 Typology of Comparator Group Specifications

The core research question being addressed in the current study is the extent to which the availability of State funding for Apprenticeships alters:

1. participation levels by employers (would the employer participate in the Apprenticeships or not);
2. if the employer would continue to participate, would they participate to the same extent (i.e. would they take fewer apprentices in the absence of funding);
3. if they continued to participate in Apprenticeships, would they deliver the same training or make modifications to it (such as making it shorter, placing less emphasis on transferable skills, not certificate successful completion of training, etc.);
4. if they did not continue to participate in Apprenticeships what would they do instead:
  - adopt some of the options in (3) but not referring to it as Apprenticeship
  - develop an alternative programme of training at the same level;

- develop alternatives to Apprenticeships but at different levels;
- take on fewer trainees in any alternative programme;
- withdraw from IVET.

### 2.6.1 Approaches to evaluation

In an ideal world one would want to observe employer behaviour rather than solely gauge their responses to hypothetical questions of a kind asked in the EASE 2011. In practice this proves difficult to do for the reasons set out below.

#### **RCTs**

Randomised Control Trials (RCTs) are regarded as the gold standard in evaluation, but in social science research they are often difficult to implement for a variety of reasons (see Gambin et al., 2010). In relation to Apprenticeships, and other forms of vocational education, often it is not so much a new programme which is to be evaluated but a modification of an existing one. If an RCT were used to evaluate changes in funding, a case could arise where some participating employers would be provided with continued funding, but others would have their funding either fully or partially removed. Employers would be randomly assigned to each group. This action in itself would be likely to have a detrimental impact on Apprenticeships since it would be likely to damage the image of Apprenticeships at least amongst those employers whose funding was fully or partially withdrawn in any experiment. It may also affect those who continued to receive funding because they would be aware that some employers have had their funding removed (i.e. a contagion effect). Additionally, any experiment would take a long time to complete since time would need to be given to employers to develop sustainable alternatives to Apprenticeships in those cases where funding was withdrawn. This could take years.

### 2.6.2 Alternatives to RCTs...

For the practical reasons set out above there is a need to consider alternatives to an RCT. These include the following.

#### ***area comparisons...***

Area comparisons have been used in the evaluation of pilot programmes such as Employment Zones and some New Deal initiatives. A comparison is made of participants in the programme (the treatment group) to that of a group in another geographical area who otherwise share the same characteristics as the treated participants (the comparator group). Care needs to be taken to ensure that the areas are comparable with respect to their labour market characteristics (although difference-in-difference techniques can be used to overcome some of the problems of comparability of different areas). In relation to Apprenticeships - or in relation to a new funding system for Apprenticeships - this would prove difficult to implement. For example, this might result in multi-site employers transferring their training activities to an area where the funding system was more beneficial to them, thus undermining the evaluation design.

#### ***comparators in the general population...***

An alternative approach is to find a comparator group in the general population under study. In other words, a group of employers which share the same, or sufficiently similar,

characteristics as the group of employers which participate in Apprenticeships, but which do not participate in Apprenticeships. In this way it is possible to observe the extent to which the comparator group offers alternatives to Apprenticeship in the provision of IVET, or rely on recruiting fully experienced workers who have completed their Apprenticeships with other employers (i.e. free riders). This is an approach which has been used in the evaluation of active labour market policies to good effect using statistical techniques which effectively match employers participating in a programme to those which are not doing so but are otherwise the same. The problem in relation to Apprenticeships is whether participating employers are in some way unique.

### ***the use of hypothetical questions...***

A relatively common approach is to introduce hypothetical questions into surveys along the lines of: “what would you do if x were to happen?” This is the approach which has been adopted in EASE2011. The principal drawback is that one is not observing behaviour and, in this case, employers may have a vested interest to say that any reduction in funding would have a dramatic impact upon their businesses. On the other hand, one cannot simply discount what employers report. If they feel that the availability of Apprenticeships has stimulated training supply over and above what it would have been in any case then that ought to be considered bona fide evidence. It provides the employers’ best estimates of the impact of Apprenticeships on training in their workplaces.

### ***...asking about the relative merits of different training programmes***

Surveys can also ask about the relative merits of one training programme over another where employers have experience of using one or more programmes. This approach was used in EASE2011 where 44% of respondents mentioned that they had used alternative approaches to Apprenticeships in training their workforce over the past three years. Employers can then provide informed assessments of their experiences of using different types of training programme. This provides an indication of the relative value employers attach to programmes which might be used to substitute for Apprenticeships.

## **2.7 What or Who is the Comparator**

Many of the approaches outlined above are predicated on it being possible to identify a comparator group. As Gambin et al. (2010) have pointed out there is no single comparator group to the Apprenticeship one. There are a number of groups which need to be considered. It is presumed for purposes of simplicity to regard Apprenticeship as principally a form of IVET, though it is recognised that it is used as a form of continuing vocational education too. With this caveat it is possible to consider the following comparators:

1. employers which provide no IVET training at all;
2. employers which provide IVET through an alternative vocational training programme to the same level;
3. employers which provide IVET through an alternative vocational training programme albeit to a different level.

Where alternative vocational training programmes are used this will include both publicly funded and supported ones and private ones which employers may have developed themselves in-house.

With the above comparators the question becomes one of identifying what leads to more and better training being delivered and how does this relate to the overall performance of the organisation.

## **2.8 A Potential Framework for Analysis**

### **2.8.1 A combination of approaches to measuring additionality might be the best way forward**

On the basis of the evidence above, an appropriate way forward might be a combination of a comparator group derived from the general population and the continued use of a dataset including surveys with hypothetical questions (e.g. if funding was removed would you continue to provide Apprenticeships?) and questions about the relative merits of various training programmes (e.g. in your opinion is programme x better than programme y which you have also been involved in?). A combination of approaches will yield the range within which estimates of additionality fall.

### **2.8.2 The use of hypothetical questions**

To deal with the hypothetical questions first. Some of the questions in EASE 2011 were designed with a specific policy issue in mind: what would happen if funding were reduced in full or in part for some groups of apprentices. The more general approach used in the earlier surveys of employers with apprentices which asked questions along the lines of “without the programme do you think you would have trained the same, more, or fewer initial trainees” are likely to yield insights over time, and over the economic cycle, about the way in which programmes such as Apprenticeships stimulate skills supply. The questions about what would happen if funding were reduced are also important because they provide an indication of how sensitive employers’ training decisions are to the costs associated with various training programmes. These are, however, views about what might happen rather than being based on observations of actual behaviour.

### **2.8.3 The use of employers’ views on the relative merits of different training programmes**

Employers’ views on the relative merits of different training programmes are also useful. Where employers have used various training programmes to meet the need in their businesses which Apprenticeships are designed to fill, their views on why they settled on one programme rather than another provides valuable information on what employers consider most valuable in a training programme. The added benefit of this approach is that it is based on actual behaviour even if the data have been collected retrospectively. At the moment, EASE 2011 provides information about the relative merits of Apprenticeships from those employers which decided they preferred this form of training, but not for those who selected an alternative and stuck with that.

In relation to the comparator groups there is a need, as highlighted above, to provide multiple comparisons which reflect the range of alternatives to Apprenticeships. The types of question which might be asked of the comparator group relate to:

- **quantitative additionality** – the training over and above that which would have been provided at the same level in any case as a consequence of Apprenticeships;
- **qualitative additionality** – e.g. whether the training is of similar duration and of similar content, whether it is certificated at the same level; whether it is more or less likely to meet the needs of the workplace both currently and in the future;
- **displacement / substitution** – e.g. extent to which as a consequence of Apprenticeships other employees are less likely to be trained (for example, less skilled workers).

There is a related question to the additionality ones above which relates to the benefits from engaging in different types of training. It is therefore worth considering what is known about the provision of IVET and organisational performance. There is evidence that a shortage of skills constrains organisational performance in a number of ways and that Apprenticeships, in particular, are regarded as being instrumental in some employers being able to offset future skill shortages (e.g. Hogarth, et al., 2012; Wintberbotham et al., 2012). Employers also report that Apprenticeships are important in ensuring that staff remain with the business. It is therefore reasonable on the basis of the available evidence to explore the extent to which the provision of Apprenticeships is associated with, for example, indicators of such issues as:

- recruitment difficulties (e.g. hard-to-fill and skill-shortage vacancies);
- labour turnover;
- organisational performance (e.g. whether the workplace is able to meet its own performance targets – this was a variable which revealed a strong association with the existence of skill shortages in ESS1999 (Bosworth et al., 2001)).

## 2.9 Conclusions

As indicated in Section 2.2 of this chapter, the State has increasingly played a key role over the past thirty to forty years in ensuring that the provision of Apprenticeship training has been sufficiently voluminous and met certain quality thresholds. This reflects policy makers' concerns over the period that the market alone would not deliver the IVET the country needed.

With the State funding a substantial share of the cost of providing Apprenticeships it is inevitable that questions should be asked about deadweight and additionality. The conundrum is how to measure these in a well-established programme such that there is no impact on the operation of the programme. As indicated above, some conventional evaluation approaches are not feasible because of the impact they would have on the delivery of the existing programme.

With the above provision in mind, the evaluation approach set out above is a pragmatic one based on using different though complementary methods:

- the use of hypothetical questioning in surveys (would you train as many people without public funding or without the Apprenticeship programme?);
- asking about the relative merits of Apprenticeships in surveys (is Apprenticeship better than the alternative available?);
- a comparison of employers' training activities where employers use Apprenticeships compared with employers which use alternatives;
- the use of multiple comparator groups to reflect the options available to employers with respect to supplying IVET.

The approach is predicated on the question: is Apprenticeship better than the range of alternatives available to employers? This can be addressed from the perspective of the content and quality of training provided and, importantly, if the provision of Apprenticeship training is more likely to result in relatively good organisational performance.

The next chapter looks at the extent to which existing data sources are able to shed any further light on the issues of additionality and deadweight over and above that provided by London Economics (2012).

# 3. Review of Data

## 3.1 Introduction

In this chapter we present a review of existing datasets. The datasets reviewed fall broadly into two categories; those that provide information on vocational training and/or Apprenticeships and those that might be used to provide supplementary information on the characteristics of firms.

The following datasets were identified as containing potentially useful information on either vocational training or Apprenticeships in particular:

- Evaluation of Apprenticeships Survey of Employers (EASE) 2011
- Employer Perspectives Survey (EPS) 2010
- National Employer Skills Survey for England (NESS) 2009
- Employer Skills Survey (ESS) 2011
- Labour Force Survey (LFS)
- Workplace Employment Relations Study (WERS)

The remaining three datasets under-review were identified as containing potentially useful information on firm characteristics and performance:

- Inter-Departmental Business Register (IDBR)
- Annual Respondents Database (ARD)
- Financial Analysis Made Easy (FAME)

The review of the datasets is summarised in Table 3.1 and described in further detail in the remainder of this chapter. Section 3.2 focuses on what, if any, information the datasets provide on the provision and uptake of IVET. Section 3.3 describes what variables could be used either to link observations across different data sets or as a basis upon which matching analysis may be carried out. Section 3.4 focuses on the most promising datasets identified as a result of the data review and compares these against the information requirements for a comparison study, developed as part of the evidence review in Chapter 2.

**Table 3.1: Review of Datasets**

**Review of Datasets**

<b>Dataset</b>	<b>Unit of Observation</b>	<b>Apprenticeship-Related Variables</b>	<b>IVET Variables</b>	<b>Potential Linking Variables</b>	<b>Potential Matching Variables</b>
EASE 2011 (Evaluation of Apprenticeships Survey of Employers)	Firm-level	<p><b>General Apprenticeship variables:</b></p> <p>Participation in Apprenticeships over past 18 months</p> <p>Main framework of participation</p> <p>Length of time formal Apprenticeships have been offered</p> <p>Stimulus for starting to provide Apprenticeships</p> <p>No. of staff that started an Apprenticeship over last 3 years</p> <p>No. of staff that started an Apprenticeship over last 5 years</p> <p>No. of staff that completed an Apprenticeship in last 3 years</p> <p>Of which, no. still working at establishment</p> <p>Reason for provision of Apprenticeships</p> <p>Planned future participation in Apprenticeships</p> <p>Reason for not providing Apprenticeships in future</p> <p>Anticipated business benefits of offering Apprenticeships</p> <p>Benefits experienced as a result of offering Apprenticeships</p> <p><b>Main Apprenticeship framework variables:</b></p> <p>No. of staff beginning an Apprenticeship over last three years</p> <p>Of which no. already employed at establishment</p> <p>Of which no. disabled</p> <p>Of which no. from ethnic minority</p> <p>Of which by age group</p> <p>Of which began level 2 Apprenticeship</p>	<p><b>General training variables:</b></p> <p>Provision of training resulting in qualifications at similar level to Apprenticeships (if so, whether similar subject area)</p> <p>Reason for above</p> <p>Internal training as a realistic alternative to Apprenticeships</p>	None	<p>Firm size (no. of employees)</p> <p>SIC Code</p> <p>Organisational structure</p> <p>Legal status</p> <p>Apprenticeship framework</p>

## Review of Datasets

Dataset	Unit of Observation	Apprenticeship-Related Variables	IVET Variables	Potential Linking Variables	Potential Matching Variables
		<ul style="list-style-type: none"> <li>Of which began level 3 Apprenticeship</li> <li>Of which had previously completed level 2 Apprenticeship at establishment</li> <li>No. of staff completing Apprenticeship in last three years</li> <li>Of which no. that still work at establishment</li> <li>Of which no. that were recruited as apprentices</li> <li>Of which % of level 2 completers have started level 3 Apprenticeship</li> <li>Of which % of level three completers that have go on to undertake other qualifications (by type)</li> <li>No. of staff currently undertaking Apprenticeship</li> <li>Use of external training providers</li> <li>Hypothetical questions:</li> <li>Extent of provision of Apprenticeships with different levels of employer funding</li> <li>Expected alternatives to provision of Apprenticeships with different levels of employer funding</li> <li>Impact on establishment of training fewer apprentices</li> </ul>			
EPS 2010 <sup>9</sup> (Employer Perspectives Survey)	Firm-level	<p><b>Apprenticeship variables:</b></p> <ul style="list-style-type: none"> <li>Awareness of Apprenticeships (and which types)</li> <li>Participation in Apprenticeships</li> <li>Planned future participation in Apprenticeships</li> </ul>	<p><b>General training variables:</b></p> <ul style="list-style-type: none"> <li>Funding/arrangement of off-the-job training</li> <li>Funding/arrangement of on-the-job</li> </ul>	None	<ul style="list-style-type: none"> <li>Firm size (no. of employees)</li> <li>SIC code</li> <li>Region</li> </ul>

<sup>9</sup> At the time of the data scoping exercise, EPS 2012 was not available, but a number of additional questions about Apprenticeships have been added to this – including many of those in NESS 2009. We recommend that the assessment of EPS is refreshed accordingly.

## Review of Datasets

Dataset	Unit of Observation	Apprenticeship-Related Variables	IVET Variables	Potential Linking Variables	Potential Matching Variables
		No. of staff currently undertaking Apprenticeships	training Reason for not providing training Provision of training leading to vocational qualification Type of vocational qualification Benefits of engaging in recognised vocational training Reason for not providing training leading to vocational qualification Use of external training providers Importance of government support for training		Organisational structure Legal status Primary sales destination Business strategy Educational profile of workforce
NESS 2009 (National Employer Skills Survey for England)	Firm-level	Apprenticeship variables: Awareness of government funded Apprenticeships Participation in government funded Apprenticeships No of staff undertaking Apprenticeships Type of Apprenticeship (advanced, adult, higher) Age profile of staff undertaking Apprenticeships (by type) Planned future participation in Apprenticeships	General training variables: Funding/arrangement of off-the-job training Funding/arrangement of on-the-job training No. of staff in receipt of training Occupations in receipt of training Annual average days of training provided per trainee No. in receipt of training towards nationally recognised qualification Level of nationally recognised qualification Use of external training providers If no training has been funded or arranged, reason why	None	Firm size (no. of employees) SIC code Legal status Region Organisational structure Occupational profile Educational profile Business strategy Awareness of Apprenticeships
ESS 2011 (Employer Skills Survey)	Firm-level	None	General training variables: Funding/arrangement of off-the-job training Funding/arrangement of on-the-job	None	Firm size (no. of employees) SIC code Legal status

## Review of Datasets

Dataset	Unit of Observation	Apprenticeship-Related Variables	IVET Variables	Potential Linking Variables	Potential Matching Variables
			<p>training</p> <p>Reason for not funding/arranging any training</p> <p>Broad category of training funded/arranged</p> <p>Proportion of training funded/arranged accounted for by H&amp;S and induction training.</p> <p>No. of staff in receipt of training</p> <p>Of which by broad occupation</p> <p>Of which leading to a nationally recognised qualification</p> <p>Of which by qualification level</p> <p>Annual average days of training provided per trainee</p>		<p>Organisational structure</p> <p>Primary sales destination</p> <p>Educational profile</p> <p>Occupational profile</p>
WERS 2004/2011 (Workplace Employment Relations Study)	Firm-level Employee-level	None	<p><b>General training variables:</b></p> <p>Employer level questionnaire: % of experienced members in largest occupational group that have been given time off from their daily work to undertake training.</p> <p>Annual average days of training</p> <p>Employee level questionnaire: No. of days of employer provided/arranged training</p>	IDBR no. (available in VML deposited version of the dataset only)	<p>Firm size (no. of Employees)</p> <p>Firm size (turnover)</p> <p>SIC Code</p> <p>Occupational profile</p> <p>Legal status</p> <p>Organisational structure</p> <p>CAPEX</p> <p>Purchases</p> <p>Employee-level educational/vocational attainment</p>
LFS (Labour	Individual-level	<b>Apprenticeship variables:</b> Participation in Apprenticeship	<b>General training variables:</b> Highest qualification currently working	None	<p>Educational attainment</p> <p>Qualification attainment</p>

## Review of Datasets

Dataset	Unit of Observation	Apprenticeship-Related Variables	IVET Variables	Potential Linking Variables	Potential Matching Variables
Force Survey)		Level of Apprenticeship Occupation of Apprenticeship (2 Digit SOC code)	towards (if any) Area of study Receipt of job-related training or education in last 1-3 months <b>For individuals in receipt of job-related training in last month:</b> Receipt of job-related training or education in last week Qualification training will result in (if any) On or off-the-job training? Location of training Funding of training Duration of training Hours spent training		Region Age Sex Marital status Industry of Employment Occupation of Employment Ethnicity Dependent children Housing tenure Travel-to-work area
IDBR (Inter-Departmental Business Register)	Firm-level	None	None	IDBR no. Name Address Postcode At reporting unit level only: Telephone no VAT Reference PAYE Reference	Firm size (no. of employees) Firm size (turnover) SIC code Region Legal status
ARD (Annual Respondents Database)	Firm-level	None	None	IDBR no.	Firm size (no. of employees) Firm size (turnover) SIC code Region Legal status Investment

## Review of Datasets

Dataset	Unit of Observation	Apprenticeship-Related Variables	IVET Variables	Potential Linking Variables	Potential Matching Variables
FAME (Financial Analysis Made Easy)	Firm-level	None	None	Company name Previous company name(s) Registered office Company registration no. Address Telephone no.	Purchases Sales Other expenditure & income indicators  Firm size (no. of employees) Firm size (turnover) SIC code Region Legal status Organisational Structure Various financial indicators

Sources : BIS (2012), UKCES (2011), UKCES (2010), IFF (2011), BIS (2011a), BIS (2011b), BIS (2011c), ONS (2012a), ONS (2011), UKDA (2012), BVD (2012).

## 3.2 Apprenticeship & IVET variables

This section of the data review focuses on the information each dataset contains about the provision of Apprenticeships as well as IVET more generally. The results of each of these aspects of the data review are discussed in turn below.

### 3.2.1 Apprenticeship Variables

The presence of data pertaining to the provision of Apprenticeships will be essential to the construction of a treatment group in a comparison study of Apprenticeship additionality. Of the nine datasets reviewed only four were found to contain information specifically related to Apprenticeships. These are the EASE 2011, NESS 2009, EPS 2010 and the LFS.

#### ***EASE 2011***

The EASE was designed specifically for the purposes of evaluating government funded Apprenticeships and as such is the most extensive source of data on this topic. One of the key strengths of the EASE is that it provides information on the provision of Apprenticeships by the main framework as well all Apprenticeships in total. This potentially allows for a more detailed analysis than the matching of apprentice employers to non-apprentice employers which has typically taken place in previous additionality studies. At the framework level, the EASE provides information on past, current and planned future provision of Apprenticeships including some details about the broad characteristics of those undertaking Apprenticeships.

#### ***NESS 2009***

Although the provision of Apprenticeships was not the primary focus of the NESS 2009 it does contain some relevant variables. Enterprises report both their awareness of and participation in government funded Apprenticeships. Some more detailed information about the provision is also available in the form of the number of staff undertaking Apprenticeships, their age profile and the level of the Apprenticeships that are being provided. The Apprenticeship-related questions were not asked in the ESS 2011 survey, but some of these have been transferred to the EPS going forward.

#### ***EPS 2010***

The EPS 2010 also contains a small number of variables related to the provision of Apprenticeships. These relate employers' awareness of Apprenticeships, the extent of their current participation in Apprenticeships and their planned future provision of Apprenticeships. The 2012 survey will contain a number of questions about Apprenticeships, including many (but not all) of those included in NESS 2009. However, we understand that it will not include details about the number of employees undertaking Apprenticeships, which was an important variable for the London Economics (2010) analysis, and that undertaken later in this report.

#### ***LFS***

Unlike the other datasets reviewed in this chapter, the LFS is an individual, rather than firm-level, dataset. As such it does not contain specific information about firms' decisions to offer Apprenticeships. However in providing details about individuals' current participation in Apprenticeships (by level) it is possible to gauge the extent of their provision. The characteristics of those individuals undertaking Apprenticeships are also

available including their educational and qualification attainment, occupation and industry of employment. The quarterly frequency of the LFS means it is also possible to analyse how Apprenticeship participation might be evolving over time. However, it is believed that the LFS underreports the number of people with Apprenticeships because many individuals are uncertain as to whether they have completed an Apprenticeship.

### 3.2.2 Other IVET Variables

Information relating to the provision of vocational education and training apart from Apprenticeships is an important data requirement for constructing a robust counterfactual. Of the nine datasets reviewed six contain information about the provision or uptake of vocational education and training. These are the EASE 2011, NESS 2009, EPS 2010, ESS 2011, WERS and the LFS.

#### ***EASE 2011***

Since the focus of the EASE is on the evaluation of government funded Apprenticeships, it contains very little information on other types of vocational education and training. The only relevant questions pertain to the provision of training that results in qualifications at a similar level to Apprenticeships and whether the employer regards internal training as a realistic alternative to Apprenticeships. Furthermore the EASE sample consists only of those employers who have recently provided an Apprenticeship. As such it does not contain an adequate counterfactual for an Apprenticeship comparison group study of additionality.

#### ***EPS 2010***

The EPS 2010 contains a number of variables related to the provision of IVET. This includes the funding or arrangement of training (both on and off-the-job) or the reasons for not doing so, the funding of training leading to a recognised vocational qualification by type or, where applicable, the reasons for not providing IVET. Broader questions about the benefits of engaging in recognised vocational training and the use of external training providers are also present.

#### ***NESS 2009 & ESS 2011***

The NESS 2009 and ESS 2011 provide a very similar amount of detail about the provision of IVET. Both datasets contain questions about the funding or arrangement of off or on the job training in general such as the number of staff in receipt of such training by occupation, the annual average number of days training provided and where applicable the reasons for not providing any training. There are also variables relating to the funding/arrangement of training leading to nationally recognised qualifications by level. The ESS 2011 contains an additional variable pertaining to the proportion of training funded/arranged that is accounted for by health & safety and induction training, and the investment in training follow-up survey asks whether an employer has spent any money with an external training provider.

Although NESS 2009 and ESS 2011 provide a similar degree of information about general IVET, ESS 2011 does not contain a question about whether Apprenticeships are being provided. This makes it impossible to determine whether a given observation in ESS 2011 can be used to construct a valid counterfactual. For this reason, EPS would need to be used for the purposes of creating a comparison group in the future.

**WERS**

Although the matched employee and employer level WERS datasets provide, in principle, a promising opportunity to analyse topics of additionality of government funded training initiatives, both the current edition of WERS (WERS 2004) and the forthcoming 2011 edition contain very little information on IVET. The employee level questionnaire asks only the number of days spent in employer provided/arranged training. No information is available on what type of training this might consist of, nor whether it could lead to a nationally recognised qualification. Some training information is provided at the workforce level in the form of a variable in the employer-level dataset about the percentage of experienced members in the largest occupational group that have been given time off from their daily work to undertake training. Information on the average annual number of days spent training is also provided.

In addition to the lack of detailed information about IVET there are also some problems with the representativeness of the employee-level sample in WERS which consists of 25 'randomly' chosen employees at each workplace.

**LFS**

The LFS includes a number of variables relating to the individual-level participation in IVET. For those individuals in receipt of job-related training or education during the past three reference months, information is collected about the duration of the training, what qualification it will result in (if any), the number of hours spent training, the location of the training and the funding of the training. Furthermore separate information is collected on the highest qualification an individual is currently studying towards and the area of study.

**3.3 Data-linking and Matching Variables**

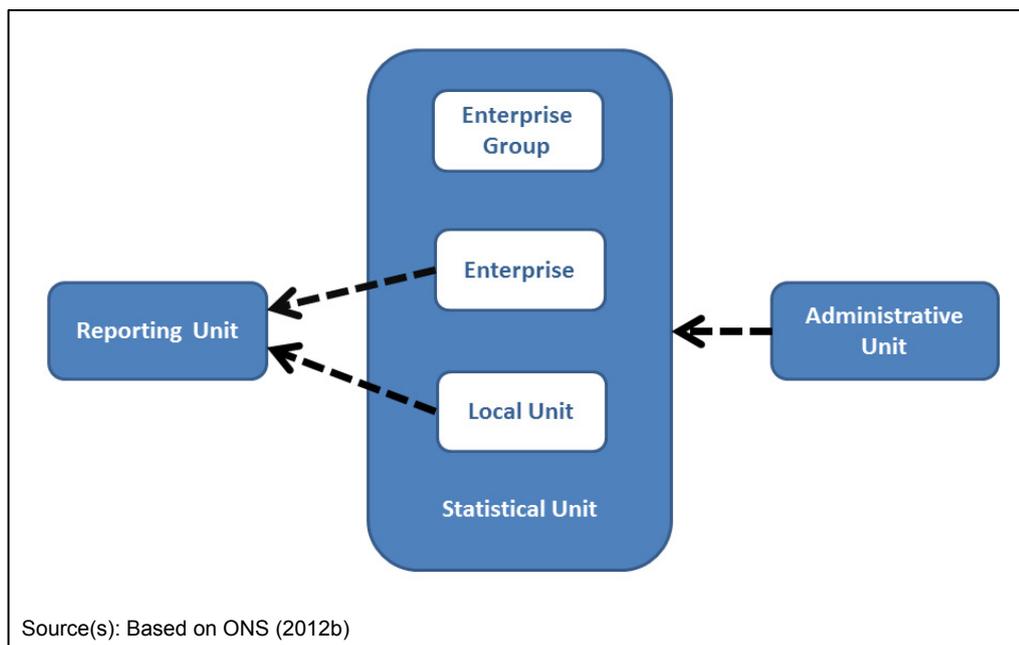
This section of the data review focuses on the variables contained in each of the datasets that could be used as a basis for either:

- linking across datasets in order to obtain additional information on a given observation; and/or
- matching observations to construct a counterfactual for use in further analysis

The findings of each of these aspects of the data review are discussed in turn below.

**3.3.1 Linking Variables**

Each of the datasets listed in Table 3 was reviewed in terms of its potential for data linkage, by which we mean the process of using common identifiers across datasets to link an observation from one dataset to an observation, referring to the same entity (firm or individual), in another dataset. The motivation for carrying out data linkage in this feasibility project is to supplement the core dataset containing information about Apprenticeships and IVET in general with additional variables, either where there is a specific information gap or to provide conditioning variables for analysis.

**Figure 3.1: Structure of the IDBR**

Only four of the nine datasets under review were found to contain variables which might be used to link observations across different datasets.

### ***IDBR***

As the primary sampling frame for both ONS and other government department business surveys, the IDBR contains information which can be used to link it to the microdata of other surveys which have an IDBR number variable. The IDBR also contains some information which can be used to link observations across datasets more indirectly such as the name, address, postcode and in some circumstances telephone number, PAYE and VAT reference number. However, the multiple units of analysis held within the IDBR can add considerable complexity when it comes to linking it to other datasets. In particular the IDBR holds three types of business units (depicted in Figure 2):

- Administrative units
- Statistical units
- Observations units

The administrative units consist of VAT and PAYE records from HMRC and company registration information from Companies House. The statistical units are defined at three different levels of disaggregation. The largest unit of disaggregation is an Enterprise Group which is defined as a group of legal units under common ownership. An Enterprise is defined as the smallest combination of legal units within an Enterprise Group that has a degree of relative autonomy. A local unit is the smallest unit of disaggregation and pertains to an individual site in an enterprise. The final unit of analysis is the reporting unit. This is the legal unit which holds the mailing address to which ONS business surveys are sent. Enterprises may choose to report their survey data for individual local units, a group of local units or the whole enterprise (ONS, 2012b). This complex structure makes achieving exact firm-level links between the IDBR and other datasets a difficult and involved process.

## FAME

The FAME dataset contains a wide range of firm-level variables which could be used to produce a link to other datasets. These include the firm address and telephone number, company name and registered office. The FAME dataset has previously been linked to the Business Structure Database (BSD), an annual snap-shot of the IDBR, using company registration numbers (Ritchie and Evans, 2009). However the use of company registration means that it will not be possible to match FAME to non-incorporated businesses in the IDBR. The FAME dataset will also not yield matches with public sector organisations.

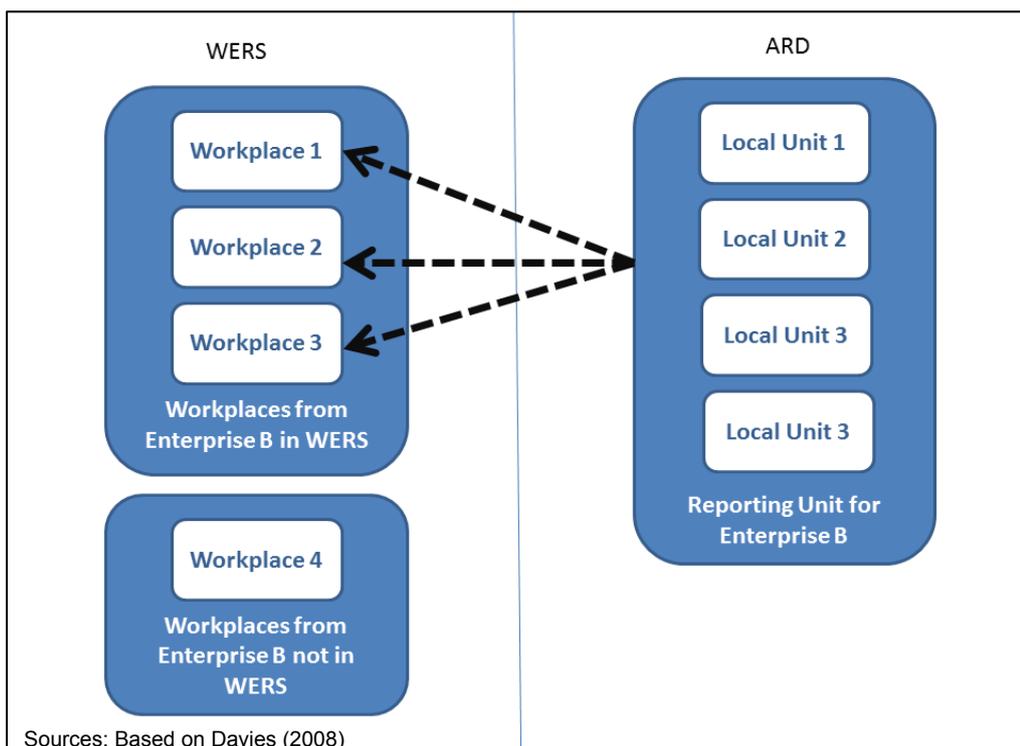
## WERS

By design, WERS is a matched employee-employer level dataset and since its sampling frame is the IDBR it is possible to link it to ONS business surveys. The 2004 WERS dataset has previously been linked to the ARD (Aumeyr and Davies, 2008) and the employee-level WERS dataset has been linked to the Annual Survey of Hours & Earnings (ASHE) via the employer-level IDBR number (Davies and Welpton, 2008). Both of these linked datasets are currently deposited in the ONS Virtual Micro-data Laboratory (VML).

One complication with linking WERS to ONS business surveys relates to differences in the units of analysis. While the ARD provides data at the reporting unit level, the unit of analysis in WERS is the workplace, or more specifically ‘the activities of a single employer at a single set of premises’ (Davies, 2008). This corresponds most closely to the local unit level of disaggregation in the IDBR which is not specifically available in the ARD.

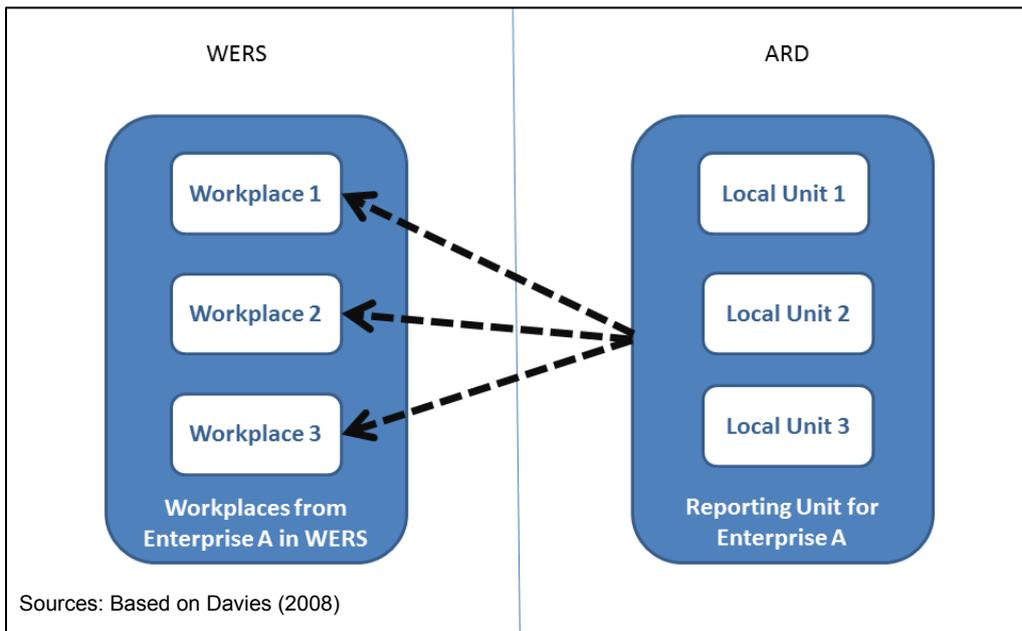
A successful link can be said to be made when a single-site establishment in WERS is linked to a reporting unit in the ARD which refers to the same single-site establishment. However Davies (2008) identifies the two types of mismatch which might arise in the case of multi-site establishments.

**Figure 3.2: Not all Local Units from a Reporting Unit are Recorded in WERS**



In the first example, depicted in Figure 3.2, the variables from a reporting unit in the ARD which refers to a multiple local unit will be linked to each workplace in that establishment that is recorded in WERS. For example, the sum of employment and turnover across all local units in the enterprise will be allocated to each workplace in the enterprise in WERS. The second type of mismatch (depicted in Figure 3) occurs when, not only does a reporting unit in the ARD refer to multiple local units in the same enterprise, but that not all of these local units are recorded as workplaces in WERS. In this case each workplace represented in WERS is allocated the sum of employment and turnover across all local units in the enterprise's ARD reporting unit.

**Figure 3.1: A Reporting Unit Refers to Multiple Local Units**



These differences in the structure of the WERS and ARD databases demonstrate that while it is possible to link WERS to ONS business survey data (as has been done for WERS2004), in practice the linking is a complex process which may not give rise to as high a proportion of reliable matches as expected.

### ***Datasets without Linking Variables***

The UKCES and BIS datasets were not found to contain any identifying information beyond what is held confidentially by the survey contractor as part of the conditions of carrying out each survey.

The LFS is an individual-level dataset. This makes it difficult to link it to a firm-level dataset as doing so would require information on the respondents' place of work. However, the LFS does not contain any such identifying information.

### **3.3.2 Matching Variables**

Each of the datasets listed in Table 3 were reviewed in terms of the variables they contain which could be used in matching analysis for the purposes of constructing a counterfactual.

**UKCES Datasets and EASE**

All of the UKCES datasets and the EASE contain the following, commonly defined, variables which could be used in matching-based analysis:

- Firm size (number of employees)
- SIC2007 code (four digit level)
- Legal status of establishment
- Organisational structure

The EPS, NESS and ESS datasets also include variables on the educational profile of the workforce and for the NESS and ESS datasets the occupational profile of the workforce. The Apprenticeship framework variable available in the EASE allows analysis to be conducted by subject area of the Apprenticeship. Additionally the NESS and EPS have a variable pertaining to business strategy and the EPS and ESS have a question relating to the primary sales destination.

**IDBR**

Since it is primarily a sampling frame, the IDBR does not contain much additional information itself which may be used for the purposes of matching analysis aside from firm size (turnover) and region of the reporting unit. The region variable may provide a route by which other conditioning variables could be added to the Apprenticeship analysis, such as regional economic and labour market conditions.

**ARD**

The ARD contains a wider variety of variables that may be used for matching analysis such as turnover, sales, purchases and other expenditure & income indicators. Furthermore the measures of employment and turnover derived from the business surveys are more reliable than those held on the IDBR itself. One point to note, however, is that enterprises with fewer than 250 employees are only sampled in the ONS business surveys on a rotating basis. Hence in a given year, the ARD may not hold any business survey data for a given SME.

**FAME**

The FAME database contains a number of variables which could be used in the process of matching analysis. Many of these variables are also provided in the ONS datasets or employer training surveys themselves, such as firm size, SIC code, legal status and organisational structure. Where FAME would be able to provide extra variables, beyond that provided by other datasets is through the array of various financial indicators it contains. However the institutional coverage of the FAME sample will limit the extent to which it can be used in further analysis of the employer training surveys.

**WERS**

In addition to the potential matching variables already contained in the NESS, EPS or EASE, WERS also contains information on the occupational profile of a workplace and via the employee-level survey information on the educational and vocational attainment of

selected members of the workforce. Capital expenditure, turnover and purchasing information is also available from the employer-level dataset.

### **LFS**

The LFS contains a relatively large amount of information about the background characteristics of individuals undertaking Apprenticeships and other types of IVET. This includes personal characteristics such as age, sex, ethnicity, region and marital status as well as employment-related variables such as occupation, industry and travel to work areas. Details on individuals' previous qualification and educational attainment are also available.

## **3.4 Assessment of Data for a Comparator Study**

In this section we assess the suitability of core datasets against the information requirements for a comparison study as set out at the end of Chapter 2. The scope of this more detailed assessment is limited to those datasets which emerged during the initial phases of the data review as providing the most relevant information on either Apprenticeships or other forms of IVET.

### **3.4.1 EASE 2011**

As the dataset that provides the most extensive information on the provision of Apprenticeships, we have identified the EASE as a candidate data source from which to construct the treatment group for a comparison group study of Apprenticeship additionality. The second column of tables 3.2 and 3.3 detail the information criteria for the treatment group, as outlined in Chapter 2 of this report. Columns three to five of the table summarise our assessment of how and to what extent the EASE meets these criteria.

The assessment shows that the EASE as it currently stands meets most of the broad information requirements and criteria. The main domain in which it currently lacks information is the provision of non-Apprenticeship IVET activities. As mentioned in Section 3.2.2 of the initial data review, since the focus of the EASE is on government-funded Apprenticeships, it contains relatively little information on other forms of work-related training. However, data on non-Apprenticeship IVET activities is not an essential information requirement for the construction of a treatment group. As such the EASE is judged to be a satisfactory data source from which to draw a treatment group in a comparison study of Apprenticeship additionality.

### **3.4.2 EPS 2010**

In providing a relatively large range of variables relating to IVET activities, as well as containing information on whether an enterprise participated in Apprenticeships, the EPS 2010 has emerged from the initial data review as a candidate data source from which to form a counterfactual. Column five in table 3.2 lists the information required for the comparator group dataset and columns seven to nine detail our assessment of how far the EPS 2010 meets these criteria. The main broad subject area in which the EPS is unable to provide any information is with regards to non-training alternatives to Apprenticeships. The EPS provides partial information on the reasons for not participating in Apprenticeships in future.

The EPS 2010 also does not provide any information about the duration and level of IVET training although information about the type of qualification IVET leads to is available. In many other cases the EPS 2010 is only able to partially satisfy the information criteria and more detailed or specific information may be required to implement some types of analyses.

As mentioned previously, we would recommend refreshing the analysis for EPS 2012 now it is available.

### 3.4.3 NESS 2009

The extent of IVET-related variables in NESS 2009 means that it has also emerged from the initial data review as a candidate dataset from which to form the comparator group. Columns six to nine of table 3.3 outline the information criteria for the counterfactual and our assessment of NESS 2009 against these.

In terms of the number of information subject areas satisfied, the performance of the NESS 2009 dataset is worse than that of the EPS 2010. NESS does not contain any information on the reasons for Apprenticeship non-participation and on non-training alternatives to Apprenticeships. It also does not provide any information in the following subject areas:

- Reasons for not engaging in IVET
- Benefits of engaging in training programme
- Business benefits of training

However, some information is available on the annual average days of training per trainee and the number of employees undertaking training leading to a nationally recognised qualification by level. Therefore when deciding between NESS 2009 and EPS 2010 as alternatives to form the comparator group, there exists a trade-off between more detailed data on the types of IVET provided and information on firms' perception of the benefits of engaging in IVET or the reasons for not doing so.

**Table 3.2: Review of EPS 2010 Against Information Requirements for Comparison Group Study**

Review of EPS 2010 Against Information Requirements for Comparison Group Study								
Broad Subject Area	Treatment Group	EASE	Question no.	Description	Comparator Group	EPS	Question no.	Description
Background information	Information about establishment	Yes	A5/A6, A1	No. of employees, SIC Code	Information about establishment	Yes	A1, A5/A6	No. of employees, SIC Code
IVET Training activities	No. of apprentices by broad sector/framework and level	Yes	B4/B12	Total no. of apprentices by main framework offered and level	Whether firm engages in IVET	Yes	D2/D3	Whether firm funded/arranged on or off-the-job training
	Where the comparator group provides alternatives to Apprenticeship it might be worth asking employers in the treatment group whether they also engage in these activities	Partially	F1/F2	Whether offered training for staff that has led to qualifications at similar level/subject area to those gained by apprentice	Type of IVET provided by broad occupational group	Partially	D2/D3/D6	Type of training/qualification it leads to but not by occupational group
					Level of training	No	n/a	n/a
					Whether bespoke in-house programme or external programme (if latter, details are required)	Partially	D12	Use of external training providers (the type of provider)
					Duration of training / content of training such as hours of learning	No	n/a	n/a
Non-training alternatives to Apprenticeships	Recruitment of fully experienced / skilled workers	Yes	F5	Alternatives to offering Apprenticeships	Recruitment of fully experienced / skilled workers	No	n/a	Whether provided training leading to recognised vocational qualification and what type of qualification
	Use of HE graduates rather than trainees	Yes	F5	Alternatives to offering Apprenticeships	Use of HE graduates rather than trainees	No	n/a	n/a
	Training-up of less skilled workers	Yes	F5	Alternatives to offering Apprenticeships	Training-up of less skilled workers	No	n/a	n/a
Reasons for not engaging in IVET	n/a	n/a	n/a	n/a	If not engaged in VET why not	Partially	D4	Reasons for not engaging in VET that leads to nationally recognised qualifications
Reasons for participation (or not) in Apprenticeships	What attracted employer to Apprenticeships	Yes	B1a	What was stimulus to start offering Apprenticeships	Why not participate in Apprenticeships	Partially	Q18b	Asks about future intentions not to invest in Apprenticeships. Arguably it is better to ask about why not currently investigating in Apprenticeships

### Review of EPS 2010 Against Information Requirements for Comparison Group Study

Broad Subject Area	Treatment Group	EASE	Question no.	Description	Comparator Group	EPS	Question no.	Description
Benefits of engaging in training programme	Delivering skills the business needs now and in the future, avoiding skills shortages, etc	Yes	E2	Benefits experienced as a result of offering Apprenticeships	Similar types of questions could be developed for those who engage in non-Apprenticeship IVET	Partially	D8	Benefits of engaging in recognised vocational training
Hypothetical Apprenticeship questions	As used in previous Apprenticeship surveys	Yes	D1/D15	Hypothetical question about no. of Apprenticeships would expect to offer under difference cost scenarios	n/a	n/a	n/a	n/a
Business benefits of training	Recruitment difficulties (hard-to-fill vacancies / skills shortage vacancies)	Yes	E1	Main business benefits to engaging in Apprenticeships	Recruitment difficulties (hard-to-fill vacancies / skills shortage vacancies)	Partially	D8	Benefits of engaging in recognised vocational training
	Staff turnover	Yes			Staff turnover	Partially		
	Meeting internal performance targets	No	n/a	n/a	Meeting internal performance targets	No	n/a	n/a

Table 3.3: Review of NESS 2009 Against Information Requirements for Comparison Group Study

Review of NESS 2009 Against Information Requirements for Comparison Group Study								
Broad Subject Area	Treatment Group	EASE	Question no.	Description	Comparator Group	NESS	Question no.	Description
Background information IVET Training activities	Information about establishment	Yes	A5/A6, A1	No. of employees, SIC Code	Information about establishment	Yes	A1, A2	No. of employees, SIC Code
	No. of apprentices by broad sector/framework and level	Yes	B4/B12	Total no. of apprentices by main framework offered and level	Whether firm engages un IVET	Yes	E4	Whether funded/arranged on or off-the-job training
	Where the comparator group provides alternatives to Apprenticeship it might be worth asking employers in the treatment group whether they also engage in these activities	Partially	F1.F2	Whether offered training for staff that has led to qualifications at similar level/subject area to those gained by apprentices	Type of IVET provided by broad occupational group	Partially	E5	No. in receipt of training by broad occupations group (but not by type of IVET)
					Level of training	Yes	E7	No. of people undertaking training towards nationally recognised qualification by level
					Whether bespoke in-house programme or external programme (if latter, details are required)	Partially	E21a/E21e	Use external training providers in last 12 months (by type of provider)
Non-training alternatives to Apprenticeships	Recruitment of fully experienced / skilled workers	Yes	F5	Alternatives to offering Apprenticeships	Recruitment of fully experienced / skilled workers	No	n/a	Annual average days training per trainee
	Use of HE graduates rather than trainees	Yes	F5	Alternatives to offering Apprenticeships	Use of HE graduates rather than trainees	No	n/a	n/a
	Training-up less skilled workers	Yes	F5	Alternatives to offering Apprenticeships	Training-up of less skilled workers	No	n/a	n/a
Reasons for not engaging in IVET	n/a	n/a	n/a	n/a	If not engaged in VET why not	No	n/a	n/a

### Review of NESS 2009 Against Information Requirements for Comparison Group Study

Broad Subject Area	Treatment Group	EASE	Question no.	Description	Comparator Group	NESS	Question no.	Description
Reasons for participation (or not) in Apprenticeships	What attracted employer to Apprenticeships	Yes	B1a	What was stimulus to start offering Apprenticeships	Why not participate in Apprenticeships	No	n/a	n/a
Benefits of engaging in training programme	Delivering skills the business needs now and in the future, avoiding skill shortages, etc	Yes	E2	Benefits experienced as a result of offering Apprenticeships	Similar types of question could be developed for those who engage in non-Apprenticeship IVET	No	n/a	n/a
Hypothetical Apprenticeship questions	As used in previous Apprenticeship surveys	Yes	D1/D15	Hypothetical question about no. of Apprenticeships would expect to offer under different cost scenarios	n/a	No	n/a	n/a
Business benefits of training	Recruitment difficulties (hard-to-fill vacancies / skill shortage vacancies)	Yes	E1	Main business benefits to engaging in Apprenticeships	Recruitment difficulties (hard-to-fill vacancies / skill shortage vacancies)	No	n/a	n/a
	Staff turnover	Yes			Staff turnover	No	n/a	n/a
	Meeting internal performance targets	No	n/a	n/a	Meeting internal performance targets	No	n/a	n/a

Sources: BIS (2012), UKCES (2010).

### 3.5 Conclusions

This chapter has investigated how far existing datasets could be used to fulfil the requirements of the potential framework for analysis discussed in Section 2.8.

It has revealed that the key datasets that will allow analysis of additionality in Apprenticeships are EASE(2011), EPS(2010) and NESS(2009). These datasets contain some commonly defined (across the datasets) information (firm size, SIC code, legal status of establishment, organisation structure) that will allow ‘matching’ of employers in the treatment and non-treatment groups (i.e. employers with apprentices matched to ‘similar’ employers without apprentices), and this may be sufficient to produce a suitable dataset for the analysis. However, none of these three datasets (in the form that we hold them) contain information that could be used to ‘link’ additional information (e.g. the region in which the employer is based) from other datasets, which might have been useful to refine the matching process. Even if they could, sample sizes would probably be too small anyway.

Other findings include:

- the individual level structure of the LFS is not useful for answering the questions of interest;
- WERS does not provide enough information on training despite providing the potentially useful properties of a matched employer/employee level dataset;
- ESS2011 does not include a question on Apprenticeships and so cannot be used either to form a counterfactual or the treatment group. Therefore, the EPS looks to be the best dataset for this purpose going forward.

Table 3.4 below summarises the availability of the required information in the key datasets of EASE2011, EPS2010 and NESS2009. The table shows that EASE contains sufficient information to form the ‘treatment group’ of firms with apprentices. Although the survey does not include data on non-Apprenticeship IVET activities, this is not an essential information requirement for the construction of a treatment group.

When deciding between NESS2009 and EPS2010 as alternatives to form the comparator group, there exists a trade-off between more detailed data on the types of IVET provided (NESS2009) and information on firms’ perception of the benefits of engaging in IVET or the reasons for not doing so (EPS2010).

**Table 3.4: Sufficiency of Existing Datasets (EASE 2011, NESS 2009, EPS 2010, ESS 2011)**

	Treatment Group	Dataset(s)	Comparator Group	Dataset(s)
Background information	Information about establishment (size, sector, etc.)	EASE	Information about establishment (size, sector, etc.)	EPS, NESS
IVET Training Activities	Number of apprentices (by broad sector / framework and level) Where the comparator group provides alternatives to Apprenticeship it might be worth asking employers in the treatment group whether they also engage in these activities.	EASE  EASE (but limited information and only for training offered at similar level/subject to Apprenticeships)	Whether engage in IVET  IF ENGAGE IN IVET: Type of IVET provided (by broad occupational group in order to provide comparison with broad sector / framework in the treatment group) Level of training Whether bespoke in-house programme or external programme Duration of training / content of training such as hours of learning Whether leads to an externally accredited qualification – if yes, which one	EPS, NESS  EPS (but not by occupation/level and no information on duration of training)  NESS (but limited information on duration of training and type of IVET)
Non-training alternatives to Apprenticeship	Need to ask Apprenticeship employers these questions too: e.g. Are Apprenticeship employers less likely to train-up less skilled workers?	EASE	Recruitment of fully experienced / skilled workers use of HE graduates rather than trainees train-up less skilled workers	NONE
Reasons for not engaging in IVET	N/A	N/A	If not engaged in IVET, why not?	EPS (but only for IVET that leads to recognised qualifications)
Why participate / not participate in Apprenticeships	What attracted employer to Apprenticeships?	EASE	Why not participate in Apprenticeships?	NONE
Benefits of engaging in training programme	As in EASE survey (e.g. based around Apprenticeships delivering skills the business needs now and in the future, avoiding skill shortages, etc.)	EASE	Similar types of question could be developed for those who engage in non-Apprenticeship IVET	EPS (but only for IVET that leads to recognised qualifications)
Hypothetical questions	As used in previous Apprenticeship surveys	EASE	N/A	N/A
Business benefits of training	Recruitment difficulties (hard-to-fill vacancies / skill shortage vacancies), staff turnover, meeting internal performance targets (as used in ESS1999), employment change	EASE (but no information on meeting internal performance targets)	Recruitment difficulties (hard-to-fill vacancies / skill shortage vacancies), staff turnover, meeting internal performance targets (as used in ESS1999), employment change	EPS (but only for IVET that leads to recognised qualifications and no information on meeting internal performance targets)

Sources : BIS (2012), UKCES (2011), UKCES (201).

# 4. Further Analysis Using Existing Data

## 4.1 Introduction

The preceding chapters have reviewed the relevant literature and available data for the analysis of additionality in Apprenticeships. The existing data from EASE2011 and NESS2009 do appear to include enough information to undertake some further analysis of deadweight and additionality, and so this chapter presents the results of further analysis, of:

- deadweight loss and additionality by framework, using data from EASE and NESS, and
- data from NESS2009 (follow-up survey) that includes information on expenditure on training.

## 4.2 Analysis by Framework

### 4.2.1 Estimating deadweight loss and additionality by Apprenticeship framework

One of the benefits of the EASE survey is that it categorises employers by the principal Apprenticeship ‘framework’ in which they are engaged (see frameworks listed in table 4.1). Certain characteristics of employers that may have an impact on their decisions to provide Apprenticeships, such as the industry they are in, are likely to vary by framework.

Although employers are categorised by framework in EASE they are not in NESS, but we wish to make use of data from NESS (to obtain a larger sample and a counterfactual). To overcome this drawback, we tested an approach to allocate firms to “proxy” frameworks by using EASE to identify characteristics of Apprenticeship employers by framework and then, using this information on characteristics, to assign apprentice employers in NESS 2009 to a notional framework.

The resulting NESS 2009 data, broken down by notional framework, was then used alongside the EASE data to make initial estimates of deadweight loss and additionality (using the London Economics approach) – for all training and for training disaggregated by framework.

### 4.2.2 Approach to Allocate Firms to Proxy Frameworks

The objective of the exercise was to identify, using EASE 2011, the characteristics of firms providing Apprenticeships in specific frameworks. The intention was to use these characteristics to assign apprentice employers in NESS 2009 (which does not contain information on framework) to a notional framework. This imposes the key limitation that the variables that are used to characterise Apprenticeship employers must be available in both the EASE and NESS datasets.

An important caveat to this objective is that EASE only provides framework information on the main framework under which a given establishment provides Apprenticeships (an establishment may provide Apprenticeships on more than one framework).

### ***Description of the Initial Approach***

Table 4.1 provides an overview of the raw (un-weighted) distribution of Apprenticeship employers recorded in EASE by primary framework. Note that the following frameworks were not considered in the eventual analysis due to their low representation in the EASE sample:

- Agriculture, Horticulture & Animal Care
- Information & Communication Technology
- Leisure, Travel & Tourism
- Other

**Table 4.1: Apprentice employers in EASE, by framework**

	<b>Employers</b>	<b>%</b>
1 Health, Public Services and Care	743	18
2 Agriculture, Horticulture and Animal Care	250	6
3 Engineering and Manufacturing Technologies	607	15
4 Construction, Planning and the Built Environment	581	14
5 Information and Communication Technology	66	2
6 Retail and Commercial Enterprise	764	19
7 Leisure, Travel and Tourism	142	3
8 Business, Administration and Law	897	22
9 Other	25	1
Total	4075	100

The following ‘characteristics’ variables were identified as being common to both the EASE and NESS datasets:

- SIC07 code
- number of employees
- legal status
- organisational structure

Some of these common variables appear to exhibit a reasonably strong association with the provision of Apprenticeships in a given framework. A cross tabulation of framework by

SIC07 Section (see table 4.2) shows that, as would be expected, for some SIC07 Sections, a large majority of Apprenticeship providers provide Apprenticeships in a single primary framework. For example, 89% of Apprenticeship employers in Section F: Construction, primarily provide Apprenticeships in the Construction, Planning and the Built Environment framework. Similarly, 80% of Apprenticeship employers in Section Q: Human health & social work activities, primarily provide Apprenticeships in the Health, Public Services and Care framework.

**Table 4.2: Cross tabulation of framework by SIC07 Section in EASE, % of employers in each SIC07 Section**

SIC07 Section	Framework									
	Health	Agriculture	Engineering	Construction	ICT	Retail	Leisure	Business	Other	Total
A: Agriculture, forestry & fishing	0	96	2	0	0			2	0	100
B: Mining & quarrying	0	0	60	40	0			0	0	100
C: Manufacturing	0	4	68	12	0			12	0	100
D: Electricity, gas, steam etc.	0	0	0	33	17			50	0	100
E: Water supply, sewerage, etc.	0	0	25	0	13	1		50	0	100
F: Construction	1	0	6	89	0			4	0	100
G: Wholesale & retail	1	4	49	1	1	2		22	0	100
H: Transport & storage	0	0	55	0	0	1		32	0	100
I: Accommodation & food service	1	0	1	1	0	6		22	0	100
J: Information & communication	0	0	0	0	46			46	0	100
K: Financial & insurance activities	0	0	0	0	3			97	0	100
L: Real estate activities	0	2	0	7	5	1		76	0	100
M: Professional, scientific & technical	1	21	18	5	3			51	0	100
N: Administrative & support service	3	12	6	16	4			49	1	100
O: Public administration & defence	5	12	1	6	2			71	0	100
P: Education	15	12	4	2	7			49	6	100
Q: Human health & social work	80	0	0	0	0			15	0	100
R: Arts, entertainment & recreation	1	26	0	1	1		5	16	2	100
S: Other service activities	1	3	1	0	0	8		7	0	100

### 4.2.3 Development of the approach

The cross-tabulation approach provides a useful indication of which variables (and values within variables) might be associated with the provision of Apprenticeships in a specific primary framework. However the dimensionality of the problem limits the extent to which this approach can be easily applied to combinations of the variables. A multivariate approach was therefore developed in which a multinomial logit regression is used to estimate the probability that an establishment with a given value of the common variables (listed above) provides Apprenticeships primarily in each of the 9 broad frameworks. The predicted values from this estimation can then be calculated in NESS and used to allocate each establishment to a notional framework.

As an indication of how well the estimation performs within the EASE sample, table 4.3. shows a cross tabulation between the actual framework and the proxy framework defined using the fitted values of the multinomial logit regression. The cells highlighted in dark grey denote those frameworks for which we will not be carrying out any matching analysis, because the fit between actual framework and proxy framework is too poor. A perfect fit to the sample would be indicated by 100% in each of the leading diagonal entries and 0% in the off-diagonal entries of the table. The quality of the actual fit to the EASE sample varies by framework. For the Health, Engineering, Construction and Retail frameworks the fit is of good to satisfactory quality. In contrast only 53% of the enterprises primarily providing Apprenticeships in the Business and Leisure frameworks are attributed to the correct proxy framework. The relatively poor fit for these frameworks may reflect that providers of these types of Apprenticeship are a more heterogeneous group or simply that the limited range of common variables in NESS and EASE (which are used as explanatory variables in the multinomial logit regression) are poor predictors of provision for these specific frameworks.

**Table 4.3: Cross tabulation of actual framework by proxy framework**

Framework	Proxy Framework									Total
	Health	Agriculture	Engineering	Construction	ICT	Retail	Leisure	Business	Other	
Health	89	0	0	0	0	1	0	8	1	100
Agriculture	0	27	10	0	0	9	9	41	3	100
Engineering	0	0	77	5	0	7	0	10	0	100
Construction	0	0	7	84	0	1	0	8	1	100
ICT	3	2	6	3	14	6	2	62	3	100
Retail	2	0	10	0	0	83	0	3	1	100
Leisure	2	9	1	0	0	16	58	12	2	100
Business	11	1	15	2	1	13	3	53	2	100
Other	8	0	0	0	0	0	12	76	4	100

Table 4.4 shows the distribution of the sample of NESS Apprenticeship employers by notional (proxy) framework, defined using the predicted values of the multinomial regression.

**Table 4.4: Tabulation of proxy framework in NESS**

	<b>Employers</b>	<b>%</b>
1 Health, Public Services and Care	331	7
2 Agriculture, Horticulture and Animal Care	89	2
3 Engineering and Manufacturing Technologies	1,611	35
4 Construction, Planning and the Built Environment	667	14
5 Information and Communication Technology	53	1
6 Retail and Commercial Enterprise	623	14
7 Leisure, Travel and Tourism	116	3
8 Business, Administration and Law	1095	24
9 Other	17	0
Total	4602	100

#### 4.2.4 Estimating deadweight and additionality using the LE approach

Having developed a method to assign employers in the NESS dataset to a proxy framework, this additional variable was then used to repeat the London Economics analysis but with the added dimension of framework. The method used to estimate deadweight loss by framework followed as closely as possible that used by London Economics for all training. In order to check that the data and method matched the LE approach, deadweight loss and quantitative additionality were estimated for all training, as well as by individual framework.

##### ***Data Preparation***

The data cleaning strategy outlined in the London Economics report was followed as closely as possible. However, the description of their methodology contained a number of gaps which made it impossible to follow exactly.

##### ***Treatment and Control Groups***

Following the approach of London Economics, the treatment group was defined as establishments with at least one apprentice over the past 12 months. The control group consisted of all other establishments. Additionally the following cases were dropped from both the treatment and control groups:

- Establishments involved in Train to Gain in the past 12 months
- Establishments that indicated that they have employees currently undertaking Apprenticeships but then list zero Apprenticeships over the last 12 months
- Establishments that indicated that they currently offer Apprenticeships but have not had any apprentices in the past 12 months

**Matching**

Propensity Score Matching was used to form control groups that contain employers that are similar (other than that they do not have apprentices) to those in the treatment group. The propensity scores were estimated using the following explanatory variables, in line with those used in the London Economics analysis:

- SIC2007 section
- number of employees
- whether establishment is part of a large organisation
- whether establishment is a PLC
- whether establishment has more than one owner
- product market strategy (collapsed variable summarising price competition, innovation and product sophistication)
- product nature (volume of production/range of services)
- whether organisation has a business training plan
- whether organisation currently has vacancies
- whether organisation currently has hard to fill vacancies
- whether organisation has skills gap
- skills gap density measure
- proportion of workforce trained to level 3 or above
- region
- primary sales location (local/regional/national/international)

The matching was carried out at the level of all proxy frameworks, and by individual proxy framework.

**Defining Outcomes**

Following the approach of London Economics, the average treatment effect on the treated (ATT) for the following two variables was calculated using the matched observations:

- The proportion of the total workforce at an establishment provided with training (excluding H&S and induction training)

- The proportion of the total workforce at an establishment provided with privately funded training (excluding H&S and induction training)

The derivation of these variables entails a number of assumptions (as detailed in the LE report). Of particular relevance are:

- Apprenticeships and TTG are the only forms of publicly funded training which have taken place
- the number of employees is relatively stable over the preceding 12 months (given that the variable for total employment is a point in time estimate whereas the variables relating to the number of employees trained refer to the past 12 months)
- various assumptions (depending on individual combinations of response) about whether survey respondents view apprentices as additional or included in the number of total employees provided with training.

There exists the additional complication when interpreting the outcomes that Apprenticeships are only fully funded for certain age groups.

### Results

In the LE conceptual framework<sup>10</sup>, estimates of 'deadweight loss' (DWL) and additionality are calculated as shown in Table 4.5 below.

**Table 4.5: Calculations of Deadweight and Additionality**

<b>Outcome variable</b>	Treated (%)	Control (%)	Deadweight pp	Additionality pp	Deadweight %	Additionality %
Proportion of workers trained	x	y		x-y		(x-y)/(x-z)
Proportion of workers trained privately	z	y	y-z		(y-z)/(x-z)	

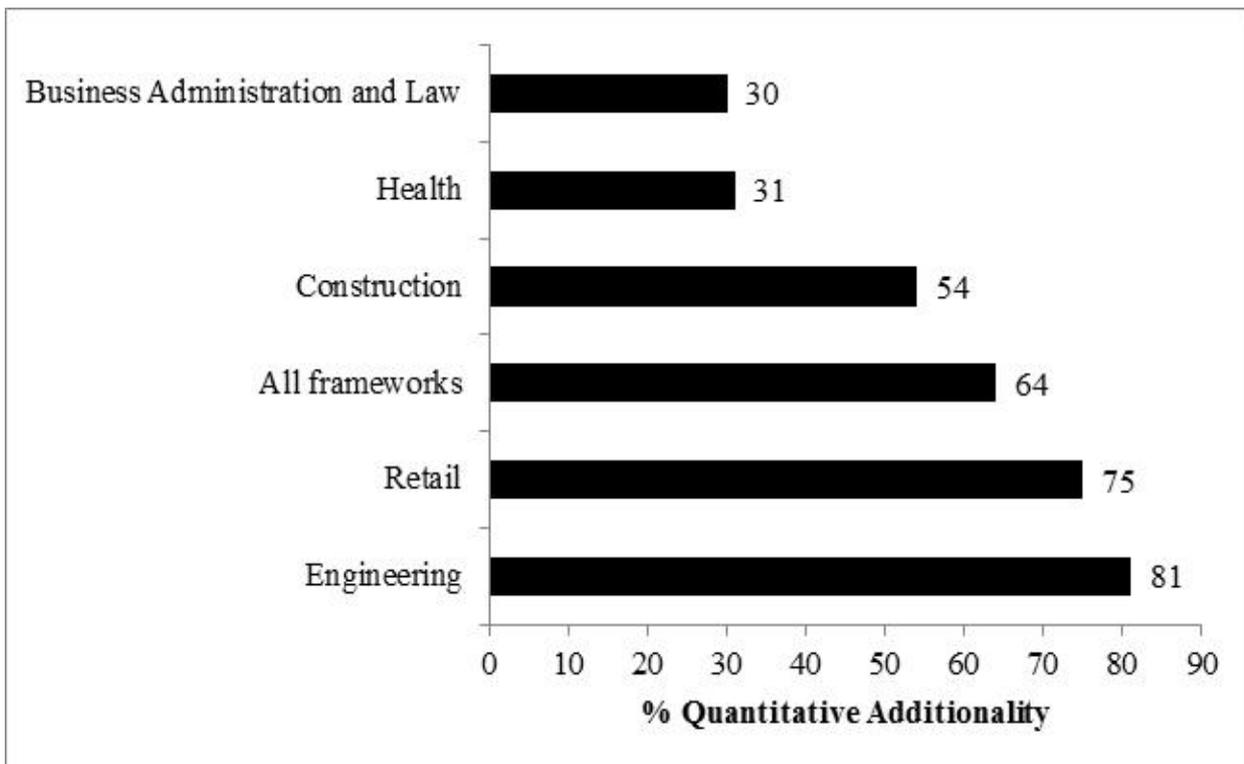
Notes :Based on Table 3 (p18) of Executive Summary in BIS Research Paper 71, Assessing the Deadweight Loss Associated with Public Investment in Further Education and Skills (May 2012).

<sup>10</sup> See *BIS Research Paper 71, Assessing the Deadweight Loss Associated with Public Investment in Further Education and Skills* (May 2012), Executive Summary Tables 1, 2 and 3 and pp 17-18.

Tables showing the results of the analysis using this method, for 'all proxy frameworks' and each proxy framework separately, are provided in figure 4.1.

Attention is drawn to the following points of note in the results:

**Figure 4.1: Summary of quantitative additionality estimates by framework**



- The estimates of additionality and deadweight loss for 'all frameworks' differ slightly from the respective estimates in the LE report (the estimate of deadweight loss is slightly higher (36% compared with 28%), and therefore additionality slightly lower (64% compared with 72%) than LE). The differences are likely to be due to the 'data cleaning' carried out, for which there was understandably limited information in the published LE report. However the results provide a consistent message about the relative size of deadweight loss and additionality.
- Estimates of deadweight loss are only statistically significant from zero for the Construction and Business Administration frameworks.
- Estimates of quantitative additionality are only statistically significant from zero for the following frameworks; total, Engineering, Construction and Retail. The lack of significance for the other frameworks is likely to be driven by the relatively smaller sample sizes.

Figure 5 summarises the findings in relation to quantitative additionality (although, as described above, only the estimates for All frameworks, Engineering, Construction, and Retail are statistically different from zero). Perhaps the most surprising finding is the relatively high level of additionality reported in engineering. Other studies have indicated

that employers in the engineering sector are recurrent investors in Apprenticeships. This is because they see no alternative to using Apprenticeships if they are to meet their current and future skill needs (Winterbotham et al., 2012; Hogarth et al., 2012). Without an adequate skills supply, engineering employers report that their businesses would be adversely affected (causing, for example, loss of business and delays developing new products, and difficulties meeting customer service standards). The findings are therefore surprising in relation to engineering because one would expect a relatively large share of employers to continue training under some form of Apprenticeship style training even if there were no public funding, simply in order to secure a future supply of skilled trades workers and technicians.

The result here, however, is likely to reflect that engineering (manufacturing) firms are not the only firms with apprentices in the engineering framework (see table 4.2), and a large proportion of employers in the retail sector (and in fact a larger number<sup>11</sup> of firms than in the manufacturing sector) have apprentices in that framework. Thus, the result in fact reflects the higher quantitative additionality of Apprenticeships to retail firms.

#### 4.2.5 Case study evidence

The case study evidence identified two broad groups of employers with respect to the rationales which determined their participation in the programme (Hogarth et al., 2012). These were

1. those who primarily invested in Apprenticeships because it represented the best means of meeting current and future skill needs. Many employers in this group had a long history of training through Apprenticeships and had found that it met their needs (for example, employers in construction, engineering, and social care);
2. those employers whilst recognising that Apprenticeships provide a means of upskilling the workforce and meeting the organisation's business needs, were also drawn to Apprenticeships as a means of attracting the better quality recruits (however defined) to work in the business and retaining staff within the business (for example, employers in sectors such as retail and business administration).

These are somewhat stylised representations. The rationales which employers provided for investing in Apprenticeships were, in practice, somewhat more nuanced than the above categorisation suggests. But the classification captures the gist of what drove employers to take on apprentices. This also tended to affect the level of investment employers made. Employers in sectors such as construction tended to invest more at Level 3 and provide more off-the-job training with the result that the net cost of training to the employer was relatively large. In construction, for example, the net cost to the employer was £26,000 at the end of training leading to an Apprenticeship at Level 3 (Hogarth et al., 2012). In contrast, employers in sectors such as retail - which were more concerned about recruitment and retention - tended to deliver training to Level 2 with a relatively low net cost accruing to the employer. In retail, for example, the net cost to the employer was £3,000 at the end of training leading to an Apprenticeship at Level 2 (Hogarth et al., 2012).

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<sup>11</sup> not shown. 296 firms in wholesale and retail compared with 194 in manufacturing.

With reference to the first group, the case study evidence suggests that employers' decisions about whether or not to invest in Apprenticeships were much less sensitive to the level of public funding. These employers needed to provide initial vocational education and training each year in order to meet their future skill needs for skilled trades workers / technicians, and tended to think their training needs could only be met through workplace based training and, in their experience, the best form of workplace based training was an Apprenticeship whether or not that was the publicly funded variant or some other form of it. These employers were also making a long-term investment because they recognised that the cost to them of delivering the Apprenticeship would take several years to recoup.

With reference to the second group of employers, they were much more sensitive to the level of public funding because they were conscious of two factors. First, levels of staff turnover were relatively high so they wanted to minimise the level of risk they faced in funding training. Often they were looking to ensure that the net cost to them at the end of the training period was at a level which could be quickly recouped after completion of the Apprenticeship. Secondly, there were potentially alternatives to Apprenticeship which they could use to improve recruitment and retention. So, at least tacitly, they were concerned about the relative cost-effectiveness of Apprenticeships and so more likely to report that both the decision to participate in Apprenticeships - and the number of apprentices trained - were more sensitive to the level of public funding than in the sectors categorised in (i) above.

A third factor to consider is who is being trained. Both the employer case study and survey evidence indicate that some employers were using Apprenticeships as a form of continuing vocational education and training (Hogarth et al., 2012; Winterbotham, et al., 2012). In other words, existing employees, some of whom had been with the employer for several years, were being enrolled as apprentices. This has the capacity to provide employees who may have missed the opportunity to obtain a formal qualification on initially leaving the formal education and training system to gain a transferable qualification. It also provides a means of providing people with the skills which they may require to competently undertake their current job - which may be subject to change because of changes in work organisation or technology - or some future job. But given that there are alternative forms of continuing vocational education available to employers, they were sensitive to the amount of public funding supporting an Apprenticeship in deciding to choose this over some alternative.<sup>12</sup> It was in sectors associated with the second group that employers were more likely to report that they were using Apprenticeships as a means of continuing vocational education because it was, potentially, a means of rewarding the individual employee and / or encouraging them to stay with their current employer. For example, 40% of employers providing Apprenticeships in retailing offered them to existing staff compared with 13% under the construction framework (Winterbotham et al., 2012).

The evidence provided above indicates that public funding is important in raising the volume of training activity across all sectors but clearly more so in some rather than others. A degree of caution is necessary in interpreting these findings from both a methodological and substantive perspective. Employers in sectors such as construction

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<sup>12</sup> In other words, if it was more cost-effective to the employer to choose Apprenticeship over some alternative they would do so. Employers saw qualitative advantages being derived from Apprenticeship which other forms of continuing training could not deliver.

would in many cases continue to train without public funding. The impact public funding has in sectors such as construction needs to be considered from a qualitative perspective too. If Apprenticeship style training was wholly funded by the employer there is a strong likelihood that it would be much less oriented towards provision of transferable skills or external accreditation. The evidence from the 1960s and 1970s suggests that this would be the case (see Section 2.2). This would also have implications for the flexibility of the labour market. This serves to illustrate the limitations of concentrating too much on quantitative additionality and the importance of considering qualitative additionality.

### 4.3 Analysis of Training Expenditure Data

Following the NESS 2009 survey, there was a follow-up survey of any employers who reported that they undertook training. The follow-up survey gathered information on expenditure on training. The results of the follow-up survey may allow an alternative measure of training (i.e. training expenditure, which could capture scale and quality of training) to be used in estimating the deadweight loss and additionality associated with Apprenticeships. This section describes additional analysis that was undertaken to assess the feasibility of using the NESS 2009 Cost of Training follow-up survey dataset for generating estimates of the deadweight loss and additionality of government-funded Apprenticeships.

#### 4.3.1 Data Processing

The ‘cleaned-up’ NESS 2009 dataset that was used for the analysis by framework (described in Section 4.2 above) was merged with the follow-up Cost of Training dataset using the unique identifier contained in each of the datasets. Checks were made on consistency variables defined across both datasets to ensure that the datasets had been correctly merged.

The follow-up Cost of Training dataset contains 7,316 observations. It was possible to match 7,292 of these observations to those in the main NESS 2009, using the unique identifiers defined across both datasets. Twenty four of the observations from the Cost of Training dataset could not be matched to the main NESS dataset and were therefore discarded.

#### 4.3.2 Treatment and Control Groups

The follow-up Cost of Training survey sampled establishments in the main NESS 2009 dataset that indicated they funded or arranged some training over the past 12 months. The Cost of Training dataset therefore does not include any information on establishments that did not report any training activity. Furthermore it is only a sample of those establishments that did report some training activity. These features of the dataset make the definition of treatment and control groups problematic. Two approaches are therefore adopted in the analysis that follows.

##### ***Approach 1***

In the first approach, the control group is defined as all establishments that were not currently providing an Apprenticeship. For establishments that recorded no training over the past 12 months, their expenditure on training was assumed to be zero. However, it is not possible to attribute a value of training expenditure for those establishments which

indicated in the main NESS 2009 survey that they had funded/arranged training but were not sampled in the Cost of Training Follow-up questionnaire. It is therefore not possible to include them in either the control or treatment groups. The treatment group consists of all establishments contained in the Cost of Training dataset that reported the provision of at least one Apprenticeship.

### **Approach 2**

A second approach was to use only those firms sampled in the Cost of Training survey to define the treatment and control groups. This has the drawback that by definition of their inclusion in the Cost of Training survey, only establishments which arranged/funded some training will be included in the analysis. This creates a sample selection problem and will have implications for interpreting estimates of DWL or additionality since they will be conditional on some training having been provided. Using this approach, the control group is defined as all firms contained in the Cost of Training dataset that did not provide any Apprenticeships. The treatment group is similarly defined as all establishments in the Cost of Training dataset that provided at least one Apprenticeship. The definition of the control and treatment groups under each approach is summarised in table 4.6.

### **4.3.3 Matching**

As for the analysis by framework, Propensity Score Matching was used to form control groups that contain employers that are similar to those in the treatment group. The propensity scores were estimated using the following explanatory variables:

- SIC2007 section
- number of employees
- whether establishment is part of a large organisation
- whether establishment is a PLC
- whether establishment has more than one owner
- product market strategy (collapsed variable summarising price competition, innovation and product sophistication)
- product nature (volume of production/range of services)
- whether organisation has a business training plan
- whether organisation currently has vacancies
- whether organisation currently has hard to fill vacancies
- whether organisation has skills gap
- skills gap density measure

- proportion of workforce trained to level 3 or above
- region
- primary sales location (local/regional/national/international)

A binary variable denoting whether an establishment has its own training centre (derived from the Cost of Training dataset) was also used in the propensity score calculation.

#### 4.3.4 Defining Outcomes

The average treatment effects of the treated (ATT) were estimated on the matched observations using the following outcome variables:

- Expenditure on off-the-job training per employee
- Expenditure on off-the-job training per trainee (in receipt of off-the-job training)

The outcome variables were defined with respect to off-the-job training only because the question related to on-the-job training in the Cost of Training survey relate to a “typical month” reference period. Therefore they are not defined on a consistent basis with the off-the-job related training variables (which refer to a “past 12 months” reference period).

In creating these outcome variables the number of employees is taken from the main NESS 2009 dataset. Since the number of employees in NESS2009 is a point in time estimate it is necessary to make the assumption that the number of employees at an establishment is relatively stable over the preceding 12 month period.

The measure of expenditure on off-the-job training is a derived variable from the Cost of Training survey which includes the following types of training costs.

- Trainee labour costs
- Fees to external training providers
- Costs of on-site training centre
- Cost of using off-side training centre in same organisation
- Management of training
- Non-training centre equipment and materials
- Travel and subsistence
- Public levies minus public grants for training

Of particular importance to this analysis is the fact that public grants for training are recorded. This means that the measure of expenditure includes only private expenditure on training.

**Table 4.6: Definition of the treatment and control groups**

	<b>Treatment Group</b>	<b>Control Group</b>
Approach 1	All establishments contained in the Cost of Training dataset that reported the provision of at least one Apprenticeship	All establishments that did not record any training in the main NESS 2009 dataset and those establishments in the Cost-of-Training dataset that did not report the provision of any Apprenticeships.
Approach 2	All establishments contained in the Cost of Training dataset that reported the provision of at least one Apprenticeship	All establishments contained in the Cost of Training dataset that did not report the provision of any Apprenticeships

#### 4.3.5 Results

The results of the analysis of the expenditure data are shown in table 4.7 and table 4.8. Table 4.7 shows the results of Approach 1, where the control group was formed from employers in both the main NESS survey and the follow-on survey. As would be expected, private training costs per trainee are higher than private training costs per employee. More importantly however, the average training costs per employee and per trainee are (statistically) significantly higher in the treatment group than in the control group. Because the firms in the treatment and control groups have been matched, this suggests that the public expenditure on Apprenticeships has leveraged in further private expenditure on training.

**Table 4.7: Results of Analysis using Approach 1**

	<b>Training costs/employee</b>	<b>Training costs/trainee</b>
Treated (£)	1350.8	2788.2
Control (£)	362.4	798.1
Difference (£)	988.4	1990.1
SE	128.7	252.8
T-statistic	7.7	7.9

The results of Approach 2, where the control group was formed of only those firms in the NESS follow-up survey (i.e. employers who had provided some training in the past 12 months) are shown in table 4.8. The results (costs per employee or per trainee) for the

treatment group are almost identical<sup>13</sup> to those under Approach 1, as they should be (the treatment groups are the same), and the results for the control group are higher than under Approach 1 (because the control group now only includes firms that undertook at least some training). However, the private training costs of employers providing Apprenticeships are still (statistically) significantly higher than in the control group, reinforcing the implication that public expenditure on Apprenticeships has leveraged in further private expenditure on training.

**Table 4.8: Results of Analysis using Approach 2**

	<b>Training costs/employee</b>	<b>Training costs/trainee</b>
Treated	1368.8	2776.3
Control	886.2	1898.9
Difference	482.6	877.3
SE	141.1	277.4
T-statistic	3.4	3.2

One factor that may distort the results is the inclusion of 'trainee labour costs' in the measure of training expenditure. It may be that trainee labour costs for apprentices (which are included in training expenditure in the treatment group) are generally higher than for other forms of training, and so the analysis could be picking up this effect.

Table 4.9 reports the average sizes of the different components of training expenditure in the different groups, and shows that all components are higher in the treatment group. Although it shows that the average trainee labour costs in the treatment group (£19,013 per employee) are much higher than those in the control group (£3,641), it does not show whether or not this is due to higher average trainee labour costs for apprentices.

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<sup>13</sup> They are not identical because the propensity score matching process can give different final matched samples for the treatment group depending on the data used for the control group.

**Table 4.9: Components of Off-the-Job Training Expenditure (per employee)**

Components of Training Expenditure	Mean (£)	Treated	Mean (%)	Control
		% in Total		% in Total
Trainee Labour Costs	19013	30	3641	23
Fees to External Provides	7433	12	1854	12
Onsite Training Centre	8650	14	2267	14
Offsite Training Centre Belonging to the Same Company	2099	3	235	1
Training Management	19936	31	5839	37
Non-training Centre Equipment & Materials	1559	2	311	2
Travel & Subsistence	954	2	309	2
Levies Minus Grants	-2398	-4	-265	-2
Labour Costs (non-course based off-the-job training)	3765	6	1223	8
Fees to External Providers (non-course based off-the-job training)	2425	4	550	3
Total	63435	100	15967	100

#### 4.3.6 Results by Sector

To see if there was any variation in results by sector, the analysis was repeated for five broad sectors (SIC07): (C) manufacturing, (F) construction, (G) wholesale & retail, (J-N) business services and (I, H, O-S) other services. Small sample sizes were an issue: for example, analysis was not undertaken for the remaining SIC07 sectors of (A) agriculture, forestry and fishing, (B) mining & quarrying, (D) electricity, gas, steam & air conditioning supply and (E) water supply, sewerage, waste management and remediation activities, as there were only six treated observations between them.

A summary of the results is shown in table 4.10 and indicates that the sample sizes available are not sufficient to support analysis by sector. Because the standard errors (SE) are large relative to the 'differences', we cannot reject the hypothesis that the differences, between private expenditure by firms in the treated and control groups, are the same across sectors.

**Table 4.10: Differences in Mean Private Training Expenditure between Treated and Control Group**

	Approach 1				Approach 2			
	Training cost/employee		Training cost/trainee		Training cost/employee		Training cost/trainee	
	Difference	SE	Difference	SE	Difference	SE	Difference	SE
Manufacturing	904.7	184.9	2687.1	637.9	680.8	230.7	2063.0	714.4
Construction	1004.6	373.9	785.0	492.7	577.3	338.4	-83.9	692.8
Wholesale/Retail	1304.0	356.2	2222.1	534.3	761.6	381.6	1175.0	568.2
Business Services	724.0	250.5	1556.9	395.9	445.8	283.3	708.9	775.8
Other Services	1144.0	341.1	2307.7	675.1	797.0	348.9	1799.0	678.6

# 5. Conclusions and Recommendations

## 5.1 Key Findings

This report has attempted to take the analysis of additionality further than that provided by London Economics (2012) by making use of the data presented in EASE2011 as well as the (National) Employer Skills Survey [(N)ESS].

At the outset two points can be made:

1. Both the analysis undertaken by London Economics and that provided in this report have a number of caveats attached to them. The principal one being that it is exceedingly difficult to ensure that the treatment group (employers which currently have apprentices) is being compared with a sufficiently well identified comparator group. In other words, it is difficult to be fully assured that like is being compared with like.
2. Despite the difficulties in making an ideal comparison, a wide range of studies are now beginning to reveal a degree of consensus in their findings. In general, those sectors where the employer encounters a relatively high net cost in delivering the Apprenticeship are also ones where the Apprenticeship is seen as a necessary investment in order to guarantee that future skill needs are met. Accordingly these are employers / sectors which display relatively low levels of quantitative additionality (although the results of our initial analysis by primary framework are not all consistent with this). This is because the employer would need to continue to invest in Apprenticeships – more or less at current levels – even if the public programme was to be abolished or its funding levels reduced. If this were to happen there may be a substantial loss of qualitative additionality (such as training to an externally accredited standard or provision of transferable skills, which would have knock-on effects for the economy as a whole).

As highlighted in the analysis undertaken in this study, one of the main difficulties facing an evaluation of Apprenticeships is that of identifying an evaluation methodology which will provide the information policy makers need without interfering with the operation of the Apprenticeship programme. The analysis presented here and in Gambin et al. (2010) suggests the use of RCTs or area comparisons are not feasible. Where a publicly funded programme is so well established it is exceedingly difficult to construct a rationale which would justify: (a) some employers being able to participate in Apprenticeships and others not, or differential levels of funding being made available to employers which were otherwise the same; and (b) even if it were possible to construct a rationale it is likely that there would be ‘game-playing’ which would undermine any evaluation design.

The only practical way forward for any evaluation strategy is through a process of matching employers according to various criteria. This requires data to be obtained from or about employers which have apprentices and their situation to be compared with those employers which otherwise have the same set of characteristics as the apprentice

employing ones, but which do not currently have apprentices. This is the approach adopted in the analysis by both London Economics and in this report. The critical issue is how data collection can be improved to allow much better comparisons to be made. As a starting point it is possible to identify a number of limitations of existing data.

## 5.2 Data Limitations

### 5.2.1 Matching employers in the treatment and comparator groups

The first area of data weakness relates to the ability to match Apprenticeship and non-Apprenticeship employers. There is no well-developed theoretical perspective about how the matching should take place. Researchers, understandably, tend to take a pragmatic approach and match on whatever is available (usually number of employees and sector). As far as possible, the matching of employers should be theoretically driven and, take into consideration the product market strategy of companies, their recruitment behaviour (do they recurrently recruit people to skilled jobs where Apprenticeship potentially provides initial vocational preparation), and approaches to training. A relatively large number of observations are required in both treatment and comparator groups in order for matching to take place if a relatively large number of matching criteria are required.

The Employer Perspectives Survey series contains information about the characteristics of employers with respect to whether they currently have apprentices (yes or no), and information about how many people they employ, their industrial sector, training activities, and so on. The sample size of c.12,000 employers in the UK, where around 9% (in 2012) reported having an apprentice, means that there are relatively few observations for employers with apprentices which can be then matched to those who do not have apprentices. To date, there has been relatively little information on the Apprenticeship itself with reference to whether it is an Intermediate, Advanced, or Higher level, or the framework(s) under which it is being delivered. In EPS 2012 however, there will be more questions on Apprenticeships – incorporating many (but not all) of the questions from NESS 2009. We recommend that the assessment of EPS 2012 is now refreshed, but the remainder of this section uses NESS 2009, EPS 2010 and ESS 2011 when considering possible comparison groups, as the recently-published EPS 2012 was not available when the data scoping exercise was undertaken.

EASE, on the other hand, provides detailed information on the types of Apprenticeship the employer is delivering but contains limited information about the characteristics of the employer (number of employees and industrial sector is available but little else). So the potential to use EPS as the comparator group (if those employers with apprentices are excluded) and the EASE as the treatment group is constrained by there being relatively little information available on which any matching of employers in the two surveys might be undertaken. EASE also contains little information about the training activities of employers other than their delivery of Apprenticeship training. Ideally, data are required about the extent to which they train other employees comparable to that collected in EPS or (N)ESS. In this way it would be possible to capture information about the extent to which Apprenticeship is related to relatively high or low levels of training of other employees.

### 5.2.2 Why do employers engage in a particular form of training?

A further data weakness relates to the information available about why employers engage in one form of training over another, or why employers do not participate in

Apprenticeships. With regard to the latter a succinct list of reasons could be developed, one of which should include the cost of delivering training via Apprenticeship versus some other route.

### 5.2.3 Do Apprenticeship employers see a better match to skill needs?

Another data issue relates to the outcomes of participating in Apprenticeships and, in particular, whether this results in skill needs being more likely to have been met. Whilst these data are abundantly available in the (N)ESS series, ESS2011 contained no questions about Apprenticeships as this information will be captured in EPS 2012 instead.

### 5.2.4 Qualitative additionality

Finally, all of the above relates to quantitative additionality. There is also a need to consider qualitative additionality and the extent to which Apprenticeships are associated with training of a higher standard (however defined), the delivery of transferable skills, and bringing new ideas into the workplace. There is some case study data relating to these but the survey datasets provide relatively little information which would allow a comparison between treatment and comparator groups.

## 5.3 Data Requirements

In summary, the data which are required from both treatment and comparator group is outlined below in table 5.1. It is assumed that the way forward is based on a survey approach which contains a treatment and a comparator group.

**Table 5.1: Outline of data required from treatment and comparator groups in a survey**

Treatment Group	Comparator Group
Detailed information on employer characteristics on which to match employers in both groups	
Detailed information about recruitment practices	
Detailed information about current training practices	
Rationale for investing in Apprenticeships	Rationale for not investing in Apprenticeships and preferences, if applicable, for some other type of initial vocational education and training
Types of Apprenticeship in which invested (for example, framework)	
Benefits derived from Apprenticeships	Are similar types of benefit derived from other forms of training?
Impact on meeting skill needs (for example, hard to fill vacancies)	

### 5.3.1 Matching employers

The general approach is based on having sufficient data to determine an appropriate match. The data which are required needs to be based on the factors which are known to affect the decision to take on an apprentice, such as product market strategy, occupational structure of employment in the workplace, and attitudes towards training especially initial vocational education and training. Much of the case study evidence suggests these are what drive employer investment in the high cost Apprenticeships though perhaps less so in the case of the lower cost ones. It would also be useful, if a means could be found, to identify the extent to which the impending retirement of skilled employees drives recruitment and training behaviour.

### 5.3.2 Recruitment practices

Ideally information is needed on recruitment practices, and whether the organisation recruits trainees and fully experienced workers, to understand whether organisations have preferences for providing initial training versus recruiting fully experienced workers.

### 5.3.3 Training activities

In order to identify whether Apprenticeship training affects other forms of training in an organisation, detailed information – of a kind collected in EPS and (N)ESS – on employer training activities needs to be collected for both groups. This is likely to include the total number of training days, initial versus continuing training provision, delivery of different kinds of training (such as on- and off-the-job training), and expenditure on training. The analysis presented earlier in this report<sup>14</sup> suggests that data on training expenditure could provide another useful measure of training activity that captures scale and potentially quality of training.

### 5.3.4 Rationale for investing in Apprenticeships

Where employers take on apprentices, information is sought on the rationales which guide that investment. Where employers do not invest in Apprenticeships, an exploration is required of why this is the case, and whether these employers prefer to invest in other forms of training or not invest in training at all. Where employers invest in Apprenticeships details are required of the number of people recruited under different frameworks and the level of the Apprenticeship.

### 5.3.5 Benefits of Apprenticeships

Where employers derive benefits from Apprenticeship, such as reduced employee turnover, higher worker commitment, there needs to be some way of identifying whether employers in the comparator group also derive the same benefits but through other means. One of the benefits which may well merit further investigation is the extent to which Apprenticeships are better able to meet skill needs by assessing relative levels of skill mismatch.

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<sup>14</sup> See *Further Analysis Using Existing Data*.

## 5.4 Options for Conducting an Evaluation Survey

There are two options which might be considered in conducting an evaluation of Apprenticeships:

- (i) a bespoke survey which contains a treatment group (employers participating in Apprenticeships) and a comparator group (employers not currently participating in Apprenticeships);
- (ii) continuing with the current EASE as the treatment group and using an existing survey, such as EPS or (N)ESS as the comparator group. In order to meet the needs of the evaluation both EASE and EPS/(N)ESS would need to contain additional questions.

Conducting a **new bespoke survey** which contained treatment and comparator groups would have the advantage of being able to address all of the issues which are germane to measuring additionality in Apprenticeships and would bypass the need to gain the agreement of the organisations which are responsible for EPS / (N)ESS. The disadvantage of this approach is that it would be expensive. It would also result in an additional employer survey being conducted – that is, the comparator group element of EASE – at a time when survey fatigue amongst respondents would appear to be driving down response rates. Moreover, many of the questions which are likely to be asked of the comparator group are already asked in other surveys. In addition, there are likely to be relatively few questions asked of the comparator group.

In contrast, **continuing with the current EASE** and using an existing survey as a comparator group is likely to have the advantage of being more cost effective, although the full cost implications would need to be worked through. The disadvantage is that it would require the agreement of the organisations responsible for the existing surveys to additional questions being added or replacing existing questions. Lengthening the survey could have a detrimental impact on response rates and if existing questions are to be removed to make way for the new ones, then their relative priority would need to be considered. There is no guarantee that agreement could be obtained which would allow all of the evaluation questions to be included, which would then potentially jeopardise the evaluation. Moreover, since there will be a need to modify some existing questions in either EPS or (N)ESS this may prove difficult to negotiate.

It is worth noting that there is relatively little scope to over-sample employers with apprentices in EPS or (N)ESS and thereby conduct a single survey which collects information for both treatment and comparator groups. At the moment EASE has a sample size of around 4,500. If one assumes that on average over the past ten years around 5% of employers have had apprentices, the EPS which has a sample size of around 10,000 in England would generate around 500 employers with apprentices which is clearly too small to undertake any detailed analysis (for example, by sector). If (N)ESS, which has a sample of around 75,000 employers in England, were used this would generate a sample of employers with apprentices of around 3,750 which is again on the low side of what is required but not far off the EASE sample size of 4,500. So there may be the possibility, in time, to use (N)ESS as a means of collecting data for both comparator and treatment groups. But there would need to be a supplementary survey to collect all of the information required about Apprenticeships. This might result in an overly complex

survey design with it better to conduct separate surveys of treatment and comparator groups.

## 5.5 Questions Required in an Evaluation

Regardless of which option is taken, the following information will be required from employers. In summary a set of information is required:

1. Firmographics – general information which will allow the organisation to be classified according to size, sector, product market strategy, etc.;
2. Recruitment behaviour – extent to which the organisation has recruited fully experienced workers into different occupational groups;
3. Information about trainees and apprentices – extent to which the employer has engaged in: (a) the recruitment of people into training positions from school, college, or university; and (b) people in Apprenticeships by age, level, and broad framework;
4. Reasons for investing (or not investing) in Apprenticeships – the reasons why the employer has invested in Apprenticeships and whether other forms of training are preferred;
5. Benefits derived from Apprenticeship training – EASE asks about this but a comparable set of indicators are needed from those who do not invest in Apprenticeships;
6. Training activity – extent to which the employer engages in off- and on-the-job training, training leading to a qualification, etc.
7. Hypothetical evaluation questions – questions which ask employers of apprentices directly whether the existence of the programme / funding led to more people being trained than would otherwise have been the case;
8. Organisational performance data – broad measures of organisational performance which can be plausibly linked to the provision of vocational training of one kind or another.

Table 5.2 outlines the extent to which these data are currently captured in EASE 2011, EPS 2010, and (N)ESS 2009 and 2011. We recommend that this is refreshed for EPS 2012 now that it is available. The general structure of the approach is essentially that of looking at the reasons of different types of employer for investing in differing types of initial vocational education and training, the type of training they provide their employees, and the result of this with respect to organisational performance.

### 5.5.1 Firmographics

In the section which classifies employers, detailed information is required which will allow employers in the comparator group to be matched to the treatment group. At the moment both EPS and (N)ESS contain detailed information about the employer. This is referred to

as firmographics in each respective survey. If EPS is taken as an example, then it is suggested that Section A (Firmographics) and Section B (HR Strategy) should be asked of respondents in both the comparator and treatment groups. It may also be worthwhile capturing information about the employer's product market strategy as currently asked in ESS2011 (A10 on location of main markets, and Section H - Business strategy and structure).

### **5.5.2 Recruitment behaviour**

Questions C1 and C6a to C7b in EPS capture the main information required about recruitment in general and recruitment of young people in particular.

**Table 5.2: Data Required to Estimate Apprenticeship Additionality**

	<b>Information required</b>	<b>Survey of Apprenticeship Employers (EASE)</b>	<b>Comparator Survey (such as ESS or EPS)</b>	<b>Whether data currently collected in EASE and either EPS or (N)ESS</b>
<b>Firmographics</b>	Number of employees	√	√	√
	Industrial Sector	√	√	√
	Location (for example, by region)	√	√	√
	Ownership (part of large organisation)	√	√	√
	Business Strategy (along lines used in previous NESS surveys)	√	√	√
	Occupational structure (at 1-digit level as used in previous NESS)	√	√	√
<b>Recruitment behaviour</b>	Recruitment of trainees Recruitment from school / college / university (questions asked in previous NESS surveys)			
	Recruitment of fully trained workers		√	
<b>Trainee / apprentice data</b>	Whether currently have apprentices (yes / no)	√	√	√
	Number of apprentices	√	√	√
	Existing employees / new recruits	√		
	Level of Apprenticeships (Levels 2/ 3/ 4)	√		
	Age of apprentices	√		
	Number of trainees (not apprentices)	√	√	√
<b>Reasons for investing in Apprenticeships</b>	Reasons provided by employers for investing in Apprenticeships	√		
	Reasons provided by employers for not investing in Apprenticeships and preferences for other forms of training		√	

### 5.5.3 Recruitment of trainees and apprentices

At the moment there is limited information – other than Apprenticeships - about the extent to which individuals are recruited to training programmes such as formal graduate trainee schemes. Some of this can be inferred from the questions EPS asks about training leading to formal qualifications at different levels – EPS Section D, questions D13 and D14 - but it would be better to have questions which asked specifically whether people were being recruited to different types of training programmes. EASE collects detailed information about the number of apprentices recruited by level and subject (EASE Section B, questions B4 to B15).

### 5.5.4 Reasons for investing in Apprenticeships

In EASE there are relatively few questions about why employers engaged in Apprenticeships (EASE Section B, Involvement in Apprenticeships, question B1a provides a useful insight) though there is a considerable amount of information about their satisfaction with the programme from which much can be inferred about employer participation (EASE Section C, all questions). In addition, EASE Section E, question 1 essentially asks why employers decided to participate in Apprenticeships.

For the comparator group a set of questions is required which asks about why employers have not invested in Apprenticeships, including whether they prefer some alternative form of training (for example, graduate training programmes). Through a combination of EPS Section D questions D13, D14 and D15 – which ask why employers have not trained their employees to an externally accredited qualification - some insights can be potentially discerned as to why employers might not invest in Apprenticeships. Similarly, EPS Section C questions C7 and C7B ask why young people have not been recruited. Preferably a direct question about Apprenticeships is needed in the comparator group survey such as EPS Section D, question D14 (which asks why training leading to a vocational qualification has not been provided). Alternatively, the questions in EASE Section E (Employer benefits) could be used to survey both treatment and comparator groups.

There is scope to harmonise the questions about sources of advice on training activities used in EPS and EASE respectively. This would ensure that a similar set of questions are asked about both groups in relation to whether they obtain their information about training issues (see EPS Section D, question D2 on the sources employers use). This could be asked of both treatment and comparator groups.

### 5.5.5 Benefits Derived from Apprenticeship Training

EASE captures a lot of detailed information about the benefits employers derive from Apprenticeships. EASE Section E captures information about the benefits the employer obtains, and EASE Section F compares Apprenticeships to other programmes. In EPS, Section D, questions D16 and D17 ask about the benefits of vocational qualifications obtained by the employer. The simplest way of harmonising the data needed in the comparator and treatment groups would be to ensure that EPS Section D, questions 16 and 17 are asked of employers in both groups in relation to Apprenticeships and other types of initial vocational training they might deliver, respectively.

### 5.5.6 Training Activity

The information required here relates to whether the existence of Apprenticeship training affects overall volumes of training. For example, whether training of Apprentices reduces the training delivered to other groups in the workplace. At the moment this is not well captured in existing surveys. EASE does not ask about training other than that delivered to apprentices. And EPS and (N)ESS asks about training levels generally. Ideally, a set of questions such as those asked in ESS2011 which ask about the number of people trained in different occupations - ESS Section F, questions F4, F4a, F9 to F11 – needs to be asked about people who are not apprentices. This needs to be asked of employers in both the treatment and comparator groups.

### 5.5.7 Hypothetical Evaluation Questions

In the surveys conducted in the early stages of the Modern Apprenticeship (MA) initiative (see Hasluck et al., (1996) and Riley and Metcalf (2003)) questions were asked of MA employers along the lines: without the Modern Apprenticeship initiative would you still have recruited the apprentice? In EASE the question related directly to funding. There is still scope to ask these questions of those in the treatment group.

### 5.5.8 Organisational Performance Data

Finally there is scope to ask questions about organisational performance which can be plausibly linked to the provision of Apprenticeships. The issues which arise in, for instance, Hogarth et al. (2012) relate to Apprenticeships having an impact on retention levels (former apprentices are reported as staying with the employer for longer) and avoiding skill mismatches (reducing levels of skill shortages and skill gaps). (N)ESS provides information on skill retention (Section B, questions B1 to B3 on occupations where there are retention problems, and B6 on the impact of those retention problems). (N)ESS also collects detailed information on skill shortages (Section C, questions C7 to C11). Additionally, (N)ESS collects detailed information on skill gaps (Section D, questions D9 to D10) In practice asking about both skill shortages and skill gaps may require too much information to be collected from the treatment group, so it may be better to choose either skill shortages or skill gaps. Since more employers report skill gaps this may yield more variation which will prove useful in any analysis.

## 5.6 Recommendation

On balance, we recommend an approach which uses a modified version of EASE to form the **treatment group** and either EPS or (N)ESS – with some modifications – to form the **comparison group**. This would appear to be a more cost-effective solution than a bespoke survey, although the precise cost implications of adding questions need to be thought through, especially given the large number of employers surveyed in EPS and (N)ESS.

## 5.7 Concluding Comments

We consider that the analysis of additionality using existing data sets has gone about as far as it can. More sophisticated econometric and statistical techniques might be applied to existing data which might improve the precision of any estimates, but they will face the same problems which have been summarised above and set out in detail in earlier

chapters. For now the picture which emerges is that employers which are likely to invest most in Apprenticeships record lower levels of quantitative additionality because they need to invest in Apprenticeship style training to meet their current skill needs. But other evidence suggests that they gain a relatively large amount of qualitative additionality which, in aggregate, is of considerable value to the economy.

Any further investigations therefore need to give qualitative additionality as much weight as the quantitative form. To do otherwise will potentially lead to a distorted view of the extent to which public funding of Apprenticeships benefits employers and their apprentices. This is particularly important at a time when public policy is driving Apprenticeship standards higher through both the Specification of Apprenticeship Standards in England, and its response to recent reviews of Apprenticeships (for example, the Holt and Richard reviews respectively).

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## 7. Glossary

ARD	Annual Respondents Database
ASHE	Annual Survey of Hours & Earnings
ATT	average treatment effect on the treated
BSD	Business Structure Database
CE	Cambridge Econometrics
BIS	Department for Business, Innovation and Skills
DWL	deadweight loss
EASE	Evaluation of Apprenticeships Survey of Employers
EPS	Employer Perspectives Survey
ESS	Employer Skills Survey
FAME	Financial Analysis Made Easy
IDBR	Inter-Departmental Business Register
IER	University of Warwick Institute for Employment Research
ITA	Industrial Training Act
ITB	Industrial Training Board
IVET	initial vocational education and training
LE	London Economics
LFS	Labour Force Survey
MA	Modern Apprenticeship
NESS	National Employer Skills Survey for England
NVQ	National Vocational Qualification
RCT	randomised control trial
TtG	Train to Gain

UKCES	UK Commission for Employment and Skills
VET	vocational education and training
WBL	Work-Based Learning
WERS	Workplace Employment Relations Study
YTS	Youth Training Scheme

## 8. Results Tables for Analysis by Framework

**Table 8.1: Estimate of deadweight loss and quantitative additionality – all frameworks**

	Private	Total	Summary	
Treated	0.292	0.456	Mean bias	1.2
Control	0.351	0.351	DWL pp.	5.9
Difference	-0.059	0.105	Quantitative Additionality pp.	10.5
SE	0.007	0.007	DWL %	36.2
T Stat	-8.270	14.160	Quantitative Additionality %	63.8

**Table 8.2: Estimate of deadweight loss and quantitative additionality – health**

	Private	Total	Summary	
Treated	0.436	0.585	Mean bias	2.8
Control	0.539	0.539	DWL pp.	10.3
Difference	-0.103	0.046	Quantitative Additionality pp.	4.6
SE	0.040	0.037	DWL %	68.9
T Stat	-2.550	1.260	Quantitative Additionality %	31.1

**Table 8.3: Estimate of deadweight loss and quantitative additionality – engineering**

	Private	Total	Summary	
Treated	0.274	0.420	Mean bias	1.2
Control	0.302	0.302	DWL pp.	2.8
Difference	-0.028	0.118	Quantitative Additionality pp.	11.8
SE	0.011	0.011	DWL %	19.1

T Stat	-2.660	11.010	Quantitative Additionality %	80.9
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**Table 8.4: Estimate of deadweight loss and quantitative additionality – construction**

	Private	Total	Summary	
Treated	0.229	0.440	Mean bias	1.3
Control	0.326	0.326	DWL pp.	9.7
Difference	-0.097	0.114	Quantitative Additionality pp.	11.4
SE	0.017	0.018	DWL %	46.0
T Stat	-5.650	6.180	Quantitative Additionality %	54.0

**Table 8.5: Estimate of deadweight loss and quantitative additionality – retail**

	Private	Total	Summary	
Treated	0.332	0.526	Mean bias	1.9
Control	0.381	0.381	DWL pp.	4.9
Difference	-0.049	0.145	Quantitative Additionality pp.	14.5
SE	0.023	0.023	DWL %	25.2
T Stat	-2.140	6.190	Quantitative Additionality %	74.8

**Table 8.6: Estimate of deadweight loss and quantitative additionality – business, administration and law**

	Private	Total	Summary	
Treated	0.335	0.486	Mean bias	0.9
Control	0.440	0.440	DWL pp.	10.6
Difference	-0.106	0.045	Quantitative Additionality pp.	4.5
SE	0.017	0.017	DWL %	70.0
T Stat	-6.300	2.600	Quantitative Additionality %	30.0

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